UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF OKLAHOMA

RICHARD GLOSSIP, *et al.*,

Plaintiffs,

v.

RANDY CHANDLER, *et al.*,

Defendants.

No: 14-cv-665-F

DEFENDANTS' POST-TRIAL SUMMARY OF EXPERT TESTIMONY AND PROPOSED FINDINGS OF FACT FROM FACT WITNESS TESTIMONY

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DEFENDANTS' POST-TRIAL SUMMARY AND PROPOSED FINDINGS OF FACT

I. Summary of expert testimony presented by Defendants

A. Dr. Joseph F. Antognini

1. Dr. Antognini is a board-certified anesthesiologist and a professor of anesthesiology at the University of California at Davis. Tr. 626:1-12. Dr. Antognini not only has direct experience using midazolam to induce anesthesia, he also has researched the mechanisms of anesthesia, specifically where the effects of anesthesia occur in the nervous system. Tr. 626:18-22.

2. There is distinction that is drawn between "pain" and "noxious stimuli." Noxious stimulation can exist without the conscious awareness of pain. Tr. 637:21-22. As Dr. Antognini put it, pain is "essentially the conscious awareness of a noxious stimulus that is applied. It is the emotional and sensory experience that we have when a noxious stimulus is applied." Tr. 637:6-9. In the context of Oklahoma's lethal injection protocol, the question is not whether the protocol provides a noxious stimulus but rather if the inmate experiences an unconstitutional amount of pain. As Dr. Antognini testified, "[m]idazolam would render somebody uncapable of experiencing or feeling pain from a noxious stimulus if you gave a sufficient dose of it." Tr. 638:12-14

3. There is also a difference between "anesthesia" and "analgesia." The latter is a reduction in the conscious perception of pain and the former reduces the transmission of pain signals after noxious stimulation. Tr. 639:6-641:13.

4. Induction and maintenance of anesthesia are also concepts discussed by the experts. Generally, a bolus dose is commonly administered to reach the desired plane of

anesthesia (induction), and then a smaller infusion is administered to stay on that plane (maintenance). Tr. 645:15-20. As the Court phrased it, "a successful induction gets the patient to the plane of anesthesia that you then want to simply maintain." Tr. 648:24-25, 649:1.

5. Dr. Antognini testified midazolam "can be used and has been used to induce general anesthesia." Tr. 642:11-12. In addition to relying on his professional experience, he supported this in numerous ways.

6. *First*, the midazolam package insert (or "FDA Label") states an approved use is to induce general anesthesia, and it provides the dose to begin and "complete" induction. DX 44 at 8, 21, *see also* Tr. 646:18-25, 649:1-7.

7. *Second*, midazolam has been shown to induce general anesthesia in animals, including those very similar to humans. In the Pieri study, researchers induced an anesthesia-like state in a monkey lasting 45 to 90 minutes using only 3 mg/kg of midazolam, and where the monkeys were more reliably under general anesthesia after 10 mg/kg and 30 mg/kg doses. Tr. 662:19-22; Plaintiffs' Exhibit ("PX") 379 at 2183-84.

8. *Third*, since its early development, midazolam has been used to induce anesthesia, including to facilitate stimulating procedures like endotracheal intubation, which are otherwise very painful. Tr. 629:21-23. In addition to his own experiences, Dr. Antognini reviewed the published research studies of others, including the Michaloudis study (Defendants' Exhibit ("DX") 52). In that study two different drugs were used to induce anesthesia. One of those drugs was midazolam. Tr. 630:13-14, 17-19. As Dr. Antognini points out, endotracheal intubation is a very stimulating procedure and typically requires anesthesia. The Michaloudis study showed little significant difference between the heart rate and blood

pressure of the two groups during intubation. DX 52 at 3. The study thus shows that midazolam can have an anesthetic effect to prevent the awareness of pain roughly equivalent to that of propofol, which is a common general anesthetic used in modern surgical practice. See Tr. 634:5-12.

9. This same conclusion is supported by the White study, which also showed no significant increase in heart rate and blood pressure after patients anesthetized with midazolam were intubated, including as compared to patients anesthetized with other anesthetics. Tr. 649:9-654:1 (discussing DX 61). This is highly relevant because intubation "is more stimulating than a surgical incision," Tr. 649:11-13; *see also* Tr. 857:7-858:25, so these studies show that midazolam is able to meet the criteria of general anesthesia, namely, a lack of response to painful stimuli.

10. *Fourth*, Dr. Antognini also relied on studies showing midazolam reliably induces anesthesia. *See* Tr. 642:13-643:8, 645:23-646:6 (discussing DX 35 at 1-2). This includes anesthesia for surgeries as significant as caesarian sections. Tr. 712:19-716:4 (discussing PX 181).

11. *Fifth*, a newer benzodiazepine, remimazolam (in the same class of drugs as midazolam), has been shown to reliably induce general anesthesia. *See* Tr. 721:20-727:2 (discussing DX 38 and 57).

12. Midazolam affects the body very quickly, even at clinical doses. The patient will likely feel the drug's effect in less than a minute. Tr. 634:24-25, 635:1-5, 16-18.

13. As an anesthetic, midazolam has a fairly lengthy recovery time, which is one of reasons that it is not routinely used as the sole anesthetic agent for longer procedures. See Tr.

653:15-17. For such procedures, where significant amounts of drug must be given and large amounts of midazolam would prolong recovery, there are better drugs available for clinical use. Tr. 641:14-25, 642:1. Dr. Antognini also told the Court that the dose of drugs administered directly affects the amount of time it takes for those effects to wear off. Tr. 664:6-8 ("In induction of general anesthesia, the larger the dose, then the longer that period will last.").

14. As pointed out in his testimony, even if there were a theoretical "ceiling effect" associated with midazolam, the real inquiry of interest is whether that ceiling occurs before or after the endpoint of reaching unconsciousness. Tr. 655:2-3.

15. Even a study on which plaintiffs rely, Inagaki (PX 270), fails to demonstrate a ceiling effect. The study shows a non-linear relationship between midazolam and halothane, but it does not show a point at which midazolam ceases to reduce the amount of halothane required to maintain the minimum alveolar concentration. Tr. 669:5-8; PX 270 at 616.

16. Regardless of a potential ceiling effect at some unknown point, Dr. Antognini is confident "that the 500 milligrams of midazolam would achieve that level of anesthesia that would prevent the inmate from having the conscious awareness that we have been discussing." Tr. 671:2-13. Moreover, even if midazolam did not render the inmate completely unconscious, it would reduce any sensation of pain. Tr. 671:19-21; *see also* Tr. 721:7-8 (discussing DX 50 and how 2 milligrams of midazolam significantly reduced the pain associated with a stimulating procedure). There is no evidence that, at this reduced level of pain, the Protocol involves unconstitutional pain and suffering.

17. The Oklahoma protocol goes above and beyond insofar as consciousness checks are concerned. Anesthesiologists do not routinely perform consciousness checks, let alone perform verbal, pinch, and sternum rubs. Tr. 672:16-17. There are clinical instances where no checks are performed at all. *See* Tr. 672:24-675:15.

18. It does not take much training to properly perform a sternum rub, Tr. 684:8-9, which is one of the noxious stimuli that can be used to assess consciousness, Tr. 684:3-4. Dr. Van Norman's assertion that a sternum rub must be performed for 30 stands in sharp disagreement with Dr. Antognini who does not see a good reason to apply a stimulus that long. A few seconds is sufficient. Any amount longer would be frowned upon. Tr. 684:16-23. "[I]f I saw an anesthesia resident, for example, doing a sternal rub for 30 seconds, I would be very upset . . ." Tr. 684:24-25.

19. The consciousness checks as performed in the Donald Grant execution, which Dr. Antognini witnessed, were sufficient to assess consciousness. Tr. 749:8-11.

20. Unconscious patients move during surgery. It happens quite frequently. In fact, this is one of the reasons patients are given muscle relaxants. Tr. 677:18-19. Those movements do not indicate consciousness because the endpoint of unconsciousness occurs before the endpoint of immobility. Tr. 677:8-9. "The dose or the amount that you need to achieve unconsciousness . . . , on average, is probably around a third of the does to produce immobility." Tr. 676:12-15.

21. Unconscious patients also breath during surgery. According to Dr. Antognini "the respiratory center is not depressed or stopped until a very deep level of anesthesia, quite a bit beyond what we would want for surgery." Tr. 680:10-12.

22. Additionally, "as far as consciousness is concerned, an airway obstruction from anesthesia and sedation does not occur in somebody who is conscious." Tr. 681:23-25. Sounds of snoring and rocking boat motions observed by witnesses are indications of being unconscious because, if conscious, the inmate "would be able to basically open up their own airway." Tr. 682:4-5.

23. Pulmonary edema, the collection of fluid in the alveolus, is a common occurrence in drug overdoses. Tr. 686:3-13. It is also associated with chronic heart failure. As explained, mild forms of pulmonary edema can be a chronic condition that people live with and manage. Tr. 687:13-16. So, there is a vast spectrum associated with pulmonary edema.

24. Dr. Antognini explained to the Court the procedure known as a whole-lung lavage, which essentially consists of pouring large amounts of saline int the lungs and then draining them—one side at a time. Tr. 689. As relevant here, this amount of fluid far exceeds that of an edema and yet, it does not rise the patient from anesthesia. Tr. 690:5-9.

25. Although presence of pulmonary edema was found during the inmate autopsies, it is highly possible edema formed post-mortem. As explained by Dr. Antognini, in several cited reports, researchers found that the presence of edema—including edema froth or foam—and the severity of edema increased post-mortem. Tr. 690:22-25, 699:23-25, 703:2-5. "Autopsy in humans is usually delayed several hours and pulmonary edema and congestion are almost constant findings. The experiments reported here suggest that in many instances such pulmonary findings in human cases may result from postmortem change," Tr. 706:18-22 (quoting DX 149 at 571).

26. Despite Dr. Edgar's claims that a presence of foamy edema was proof that the edema formed before the administration of vecuronium bromide—asserting that air movement is required to produce such foam, Dr. Antognini pointed out that residual air can indeed create foaming. A simple occlusion of the airway is not enough. Dr. Edgar's reliance on the Said study is misplaced (PX 816). Dr. Antognini pointed out that those findings were based on a study that removed residual air from the lung in addition to occluding it. Tr. 691-92. "So, it's not the occlusion per se, that prevented the lack of foam, it's getting all the air out of that lung unit." Tr. 692:17-18.

27. Based on the "buffering" capacity of blood to neutralize acidic injections and the cardiac output of an average human, pulmonary edema induced by the acidity of a 500 mg midazolam injection is highly unlikely. Tr. 694:13-18.

28. The dose of midazolam administered in the Oklahoma protocol is sufficient to cause unconsciousness to the level that an inmate would not experience the administration of vecuronium bromide. Tr. 717:10-14. This is true even though the precise drug administration times may vary because the effects of midazolam would still be sufficient to maintain unconsciousness fifteen minutes after administration, a time that exceeds the generally undisputed time of death. Tr. 717:19-20

29. Similarly, an inmate would not experience pain from the administration of potassium chloride because of the level of unconsciousness 500 mg of midazolam produces. Tr. 717:24-718:7.

30. Although comprising the bulk of Dr. Van Norman's testimony, very little information supporting the idea that the inmates were in conscious pain or suffering can be

gleaned from the EKG strips. When asked about the strips, Dr. Antognini was clear: "I did not see anything to indicate to me that the inmate – inmates would have been experiencing pain or suffering during the execution process." Tr. 745:9-11. Additionally, "you cannot tell loss of consciousness or consciousness from those strips." Tr. 746:11-12.

31. Despite Dr. Williams's unorthodox opinions to the contrary, a firing squad would result in severe pain. Tr. 752:13, 25. That pain may only last for less than 10 seconds, if the marksman were true, but it would be severe. Tr. 752:18-753:2. Hanging could also result in severe pain. Tr. 753:3-21.

32. Dr. Antognini also personally witnessed the execution of Donald Grant. Dr. Antognini observed that by 10:05:32 of the execution, D. Grant appeared to be unconscious. Tr. 736:17-20. After this, Dr. Antognini observed a "rocking boat" motion, though the motion was not severe. Tr. 736:23-24, 737:14-16. Donald Grant also experienced a partial airway obstruction, as observed by his snoring. Tr. 739:19-740:2.

33. A member of the team entered the execution chamber at 10:08:55. Tr. 738:16. A sternal rub was performed. Tr. 738:20. Dr. Antognini also heard the verbal stimulus of the team member call out "Donald, Donald." Tr.738:22. Via monitor, Dr. Antognini witnessed what he described as squeezing the right arm and wrist. Tr. 739:3-4. Thus, three consciousness checks were performed: sternal rub, pinching, and calling of the name. Tr. 739:5-6. Donald Grant did not respond to any of the consciousness checks. Tr. 739:17.

34. The sternum rub performed on Donald Grant was not impeded by the chest straps. Tr. 749:24-750:4. A sternum rub may extend onto the manubrium and still generate a sufficiently noxious stimulus to assess consciousness. Tr. 750:11-16.

35. Donald Grant appeared to stop breathing at 10:10:49. Tr. 740:19-20. Dr. Antognini then observed bubbles flowing in the IV at 10:11:07 and 10:11:52. Tr. 741:2.

36. The physician entered the execution chamber listened to the heart with a stethoscope; checked for a pulse; and checked his pupils. Tr. 743:17-19. After the examination, Director Crow entered the chamber and declared the time of death. Tr. 743:23-24.

B. Dr. Ervin Yen

1. Dr. Ervin Yen is a full-time anesthesiologist at St. Anthony Hospital in Oklahoma City. Tr. 1074. He has practiced in Oklahoma hospitals for nearly four decades. Tr. 1074. He has specialized for decades in cardiovascular thoracic anesthesiology, meaning he takes care of patients during various chest and heart procedures. Tr. 1075-76; 1160-61.

2. Dr. Yen has served as President of the Oklahoma Society of Anesthesiologists and as Chief of Anesthesiology at St. Anthony. Tr. 1074-75. He now serves, and has for years, as Oklahoma's delegate to the American Society of Anesthesiologists. Tr. 1075. Dr. Yen was elected by his anesthesiology colleagues to these positions. Tr. 1075. He has also served—at their request—as the anesthesiologist for four of his colleagues' heart surgeries. Tr. 1075-76.

3. In Dr. Yen's expert medical opinion, Oklahoma's three-drug protocol is adequate to carry out an execution in a manner that minimizes, as much as possible, the pain and suffering an inmate might experience. Tr. 1076-77, 1160. For this opinion, Dr. Yen relies primarily on his decades of experience with the drugs in question. Tr. 1086.

4. Dr. Yen has administered midazolam for approximately 35 years. Tr. 1079-80. He has likely administered midazolam to 6,000 or more patients, in dosages of up to 20 mg or even 30 mg. Tr. 1081. Dr. Yen's colleagues have utilized up to 50 mg of midazolam. Tr. 1081.

5. Dr. Yen administers midazolam to 4-5 patients a week. Tr. 1079-82. At the lower doses that he typically uses, midazolam takes anywhere from 1 to 3 minutes to take effect. Tr. 1104. Midazolam, like most medications, works faster at higher dosages. Tr. 1104.

6. Midazolam is a sedative that has hypnotic, amnestic, anti-anxiety, anti-convulsant, and muscle relaxant properties. Tr. 1078-79, 1082, 1109.

7. Midazolam is a central nervous system depressant, meaning it depresses a person's ability to comprehend what is occurring. Tr. 1078. Midazolam can also depress bodily functions that the brain controls, like breathing. Tr. 1078-79.

8. Midazolam is a benzodiazepine, like diazepam (Valium). Tr. 1078. Like other benzodiazepines, midazolam can be fatal. Tr. 1105-06. Less than two years after its introduction in the U.S., 66 midazolam deaths from cardiorespiratory depression had been reported. Tr. 1105-06. As a result, the recommended dosage was lowered. Tr. 1106-07.

9. Dr. Yen administers midazolam for every heart surgery; those surgeries involve significant noxious stimuli, including a chest incision and sawing through bone. Tr. 1079. Dr. Yen has also used midazolam to intubate patients rapidly. Tr. 1082.

10. An execution does not involve stimuli as noxious as heart surgery. Tr. 1080. The most painful part of an execution, in Dr. Yen's opinion, is starting the IV. Tr. 1080.

11. In Dr. Yen's expert medical opinion, midazolam alone can be used to induce general anesthesia. Tr. 1082. Dr. Yen defines induction of general anesthesia as actually achieving or arriving at a state of general anesthesia in a patient. Tr. 1083-84.

12. Dr. Yen used an initial dose of 5 to 10 mg of midazolam alone to induce general anesthesia 5 to 10 times earlier in his career. Tr. 1082-84. Dr. Yen doesn't do so now because it would put patients out too long and potentially cause breathing issues. Tr. 1085

13. Dr. Yen would use midazolam alone to induce general anesthesia now if the circumstances called for it. Tr. 1085. To do so, Dr. Yen would start with at least 10 mg (and maybe even 20 mg) on a healthy patient; he would use less on an unstable patient. Tr. 1085.

14. Dr. Yen's opinion that midazolam alone can induce general anesthesia is not unique in the anesthesiology community. Tr. 1086. Such use is confirmed by the FDA-approved package insert and other sources. Tr. 1087-1093. The package insert says midazolam can "complete induction" and "[i]n resistant cases, up to 0.6 mg/kg total dose may be used for induction but such larger doses may prolong recovery." Tr. 1091-92; DX 44 at 21.

15. It is Dr. Yen's expert medical opinion that midazolam alone can be used to maintain general anesthesia, but that this is not typically done because it would put patients out for too long. Tr. 1102-03; Tr. 1179. Maintenance is not particularly relevant to executions, however, since even a 20 mg of midazolam would last 15 to 20 minutes. Tr. 1103.

16. Analgesia means "without pain," whereas anesthesia means "without feeling." Tr. 1104. Midazolam, even if not an analgesic, does decrease pain perception significantly, because it eliminates feeling. Tr. 1079; Tr. 1104-05; 1123-24. Dr. Yen uses midazolam to help patients avoid being conscious of pain. Tr. 1082. In Dr. Yen's expert medical opinion, an inmate given 500 mg of midazolam would attain general anesthesia and feel no pain. Tr. 1104-05. Even deep sedation would be sufficient to eliminate pain from an execution. Tr. 1157.

17. A large dose of midazolam, like 60 mg, would likely negatively affect breathing, either from an obstructed airway or a relaxation of breathing muscles. Tr. 1093. The package insert warns that IV midazolam "has been associated with respiratory depression and respiratory arrest." Tr. 1094-95; DX 44 at 2. Even 5 mg of midazolam could stop breathing. Tr. 1095.

18. Dr. Yen has never observed a ceiling effect with midazolam; in his own practice more midazolam given has always led to less consciousness. Tr. 1103.

19. All drugs have a variable effect. Tr. 1116-17. Midazolam is not uniquely variable. Tr. 1117. Variability decreases when dosage increases. Tr. 1118.

20. Vecuronium bromide is a muscle relaxant that will, in sufficient doses, keep patients from moving. Tr. 1120-21. Vecuronium bromide will not raise an anesthetized person to consciousness, nor will it reverse or neutralize midazolam's effects. Tr. 1120.

21. Potassium chloride is a salt used in heart surgery that makes the heart stop quickly. Tr. 1121. Dr. Yen has administered potassium chloride to patients. Tr. 1121, 1185. Potassium chloride can be uncomfortable for some patients, to varying degrees, although Dr. Yen has seen patients not be uncomfortable at all. Tr. 1081, 1122. Potassium chloride will not neutralize or reverse midazolam. Tr. 1122. Under anesthesia or deep sedation, one would not feel pain from potassium chloride. Tr. 1123-24.

22. Administering an analgesic such as fentanyl prior to midazolam would not reduce pain during an execution any further than midazolam itself. Tr. 1124-25.

23. Dr. Yen frequently sees a "rocking boat" motion in anesthetized patients, from airway obstruction. Tr. 1109-10, 1139. He has never seen it in a conscious patient. Tr. 1110.

24. Patients commonly move under general anesthesia. Tr. 1107-08; 1139. This includes leg, arm, and finger movements, rocking boat motions, and coughing. Tr. 1108. Movement does not mean a patient is conscious unless it is purposeful. Tr. 1108-09; 1139.

25. Tearing from the eyes during anesthesia does not indicate consciousness. Tr. 1111. Neither do eyes that do not fully close. Tr. 1111. Dr. Yen has seen both. Tr. 1111.

26. Patients under general anesthesia can regurgitate if they have consumed something recently. Tr. 1115-16.

27. To monitor consciousness during a surgery, Dr. Yen analyzes heart rate, blood pressure, and movements; he also talks to the patient. Tr. 1109, 1112. Screaming or yelling is not typically required to check for consciousness, however. Tr. 1113. A sternal rub can also be performed. Tr. 1146-47. Not all doctors perform sternal rubs the same way. Tr. 1147. A sternal rub can be done through clothing or a strap. Tr. 1153. Every doctor knows where the sternum is located. Tr. 1154.

28. In applying a painful stimulus to check a person's consciousness, the painful stimulus is not typically the same magnitude as the painful stimulus of the surgery. Tr. 1104.

29. Oculocephalic and corneal consciousness checks are not required for the practice of anesthesiology, nor do Dr. Yen or his partners use them regularly. Tr. 1168-69.

30. A pulse oximeter measures oxygen in the blood. Tr. 1097. When a pulse oximeter reading goes down to 80 or 90, it can indicate a life-threatening situation. Tr. 1096-97. As a reading goes down, it becomes less accurate; the actual number is probably lower. Tr. 1097. Dr. Yen has never seen a dicrotic notch on a pulse oximeter waveform. Tr. 1097-99.

31. With a person who has been given a large dose of a benzodiazepine has a pulse oximeter reading of 73 or 81, they would not be conscious. Tr. 1166.

32. It is Dr. Yen's expert medical opinion that pulmonary edema in a midazolam execution would likely be caused by negative pressure: *i.e.,* airway obstruction would create a vacuum in the chest, which would suck fluid out of blood vessels and into the lungs. Tr. 1157-59. Dr. Yen has seen this type of pulmonary edema, and it takes several minutes. Tr. 1157.

33. It is also Dr. Yen's opinion that pulmonary edema in an execution could occur—potentially in tandem with negative pressure—because the heart is not pumping well, leading to fluid leaking into the lungs. Tr. 1157-59. He calls this cardiogenic shock. Tr. 1157.

34. In Dr. Yen's opinion, the negative pressure and cardiogenic shock would only occur after an inmate lost consciousness. Tr. 1159-60. Moreover, the edema would make an inmate less conscious, rather than cause him to regain consciousness in any way. Tr. 1160.

35. It is Dr. Yen's expert medical opinion that the medical professionals listed in Oklahoma's execution policy—physician, physician's assistant, nurse, etc.—are qualified to set an IV and check consciousness, and that an anesthesiologist is not necessary. Tr. 1125-27.

36. As a cardiovascular anesthesiology specialist, Dr. Yen has substantial experience with painful stimuli applied to the chest, including bullets, knives, and tools. Tr. 1161. It is Dr. Yen's expert medical opinion that, if shot in the chest, an inmate would likely have brain activity for seconds and perhaps even more than a minute, during which they would be suffering from pain. Tr. 1162. Dr. Williams is incorrect that a bullet to the heart would not hurt; it would be very painful because the bullet is sure to pierce bones. Tr. 1163.

37. In Dr. Yen's opinion, pain would occur even if a gunshot stopped circulation or causes heart fibrillation; patients who have automatic implanted defibrillators can feel the shock of the defibrillator even though circulation has stopped for seconds. Tr. 1164-65.

38. In Dr. Yen's expert medical opinion, the possibility of pain from a gunshot wound to the chest is much greater than that of a midazolam injection of 500 mg. Tr. 1165.

39. Dr. Yen attended the executions of John Grant, Bigler Stouffer, and Gilbert Postelle. Tr. 1077, 1127, 1129, 1143-44, 1148-49. If he believed their executions were botched,

he would say so. Tr. 1127, 1144, 1149. Soon after each execution, he documented his views in sworn affidavits. Tr. 1077, 1144, 1150. His opinions about Oklahoma's protocol did not change after witnessing these executions. Tr. 1077-78, 1141, 1160.

40. In Dr. Yen's expert medical opinion, John Grant lost consciousness 30 to 45 seconds after the midazolam began flowing. Tr. 1129-30. Signs of unconsciousness he observed included: Grant stopped screaming and looking around, he quickly closed his eyes, and he did not make purposeful movements. Tr. 1129-31.

41. Most significantly, Grant began the rocking boat motion, which indicated he was so unconscious at such a deep level that his airway was obstructed. Tr. 1130. This was validated by the readings showing his blood-oxygen levels were plummeting. Tr. 1130-31; *see* PX 805. This motion cannot be properly characterized as a convulsion or a seizure. Tr. 1140.

42. Grant made no purposeful movements after his rocking boat motion. Tr. 1131. He coughed, which indicated he had secretions in his throat, but that is not uncommon. *Id.*

43. A substantial amount of amber-colored fluid came out of Grant's mouth; contrary to Dr. Van Norman, this was passively regurgitated, not actively vomited. Tr. 1131-34. Dr. Yen's immediate conclusion was that Grant had eaten recently. Tr. 1140. Had Dr. Yen known this beforehand, he would not have found the regurgitation surprising at all. Tr. 1140.

44. Grant's regurgitation resembled what Dr. Yen has witnessed when a patient undergoes anesthesia with a full stomach. Tr. 1134-35.

45. Dr. Yen never saw regurgitation disappearing back inside Grant's mouth. Tr. 1142. And an autopsy found only "patchy vomitus" in his airway, with none of it reaching his lungs. Tr. 1141-43. This verified that Grant's airway was indeed obstructed. Tr. 1142-43.

46. In Dr. Yen's expert medical opinion, John Grant was under general anesthesia during his regurgitation. Tr. 1136. In Dr. Yen's expert medical opinion, John Grant was not in pain during his execution, other than from the initial insertion of IV lines. Tr. 1140-41.

47. Dr. Yen did not witness the consciousness check during Grant's execution because he thought Dr. Doe was cleaning the inmate. Tr. 1137. Even so, Dr. Yen saw Dr. Doe's hood moving, which could have been caused by him speaking to the inmate. Tr. 1137. Dr. Yen disagrees with Dr. Van Norman that his not hearing Dr. Doe during the execution means Dr. Doe didn't speak. Tr. 1114. Dr. Yen believes a consciousness check was performed, and that Grant was unconscious before the check. Tr. 1137-38.

48. After Dr. Doe left the room, Dr. Yen saw Grant's head turn slightly to the left and his left shoulder move slightly. Tr. 1138. These were not purposeful movements. Tr. 1138.

49. Dr. Yen could not tell precisely when midazolam was given to Stouffer. Tr.1145. Although Dr. Yen is not confident about the timing, in his medical estimation Stouffer became unconscious within 30 to 45 seconds of being given midazolam. Tr. 1146. This is based on the fact that, after Stouffer's statement, he closed his eyes and made no purposeful movements. Tr. 1145-46. Indeed, he barely moved at all except slight breathing motions. Tr. 1145-47.

50. For a consciousness check, Dr. Yen observed Dr. Doe placing his hands on Stouffer's chest, applying pressure, and shaking him. Tr. 1146. Dr. Yen believes this could have been a sternal rub, which can be performed with the fist or palm. Tr. 1146. He also saw Dr. Doe's hood moving, like perhaps he was speaking. Tr. 1146. In Dr. Yen's expert medical opinion, these consciousness checks were sufficient to determine unconsciousness. Tr. 1148.

51. In Dr. Yen's expert medical opinion, Stouffer was unconscious before unconsciousness was declared, and he did not suffer pain for the remainder of the execution. Tr. 1148. Nothing about the Stouffer execution surprised Dr. Yen, nor did he witness anything unusual. Tr. 1147-48.

52. In Dr. Yen's expert medical opinion, there was no difference between the John Grant and Stouffer executions in terms of the effectiveness of midazolam. Tr. 1148.

53. In Dr. Yen's expert medical opinion, Postelle's execution was carried out smoothly, just like Stouffer's. Tr. 1152.

54. Dr. Yen did not see when the drugs were first administered to Postelle. Tr. 1151.

55. In Dr. Yen's expert medical opinion, Postelle was unconscious and under general anesthesia around 2.5 minutes after the execution started. Tr. 1151, 1156. Evidence of this included: Postelle's movements gradually slowed down, he stopped looking around, he stopped swallowing, his toes stopped twitching, and his eyes gradually closed. Tr. 1151. At the 2.5-minute mark, Postelle's movements stopped; seconds later, Dr. Yen saw one last wiggle from the fingers of Postelle's left hand. Tr. 1151. This was not purposeful. Tr. 1151.

56. Dr. Yen did not see any later movement from Postelle's finger. Tr. 1108. If such a movement did occur, Dr. Yen believes it is plausible that such a movement could have been caused by the blood pressure cuff expanding. Tr. 1108-09. Dr. Yen did not see tears, nor did he see his eyes remain open. Tr. 1111, 1152. Dr. Yen did not see anything during the Postelle execution that concerned him or surprised him. Tr. 1152, 1156.

57. Dr. Yen witnessed a consciousness check on Postelle. Tr. 1152-53. Dr. Doe twice put his hands on Postelle's chest, on the sternum or breastbone, and shook him

vigorously; he also reached down to Postelle's right side and did something Dr. Yen couldn't see clearly. Tr. 1153. It was also possible Dr. Doe was speaking to Postelle. Tr. 1153. Dr. Yen does not believe it is accurate to say he did not witness a sternum rub on Postelle. Tr. 1154.

58. Dr. Yen disagrees with Dr. Van Norman that the consciousness check on Postelle was insufficient. Tr. 1155. Dr. Yen does not believe a sternal rub needs to be 30 seconds. Tr. 1155. He has never done one that long; his last less than 10 seconds. Tr. 1155.

59. Dr. Yen does not agree with Dr. Van Norman that the three executions he witnessed, including Postelle's, involved the administration of a severe amount of pain. Tr. 1155. Rather, in his expert medical opinion, the only pain suffered by Postelle would have been from the IV placements prior to the administration of drugs. Tr. 1155.

60. In Dr. Yen's expert medical opinion, the reaction from inmates that he saw with 500 mg of midazolam is similar to what he would see with other anesthetics. Tr. 1165.

61. In Dr. Yen's expert medical opinion, the post-execution evidence he reviewed confirmed that the inmates' blood pressure and heart rates went down during the execution, which is not indicative of pain. Tr. 1165-67.

C. Dr. Daniel E. Buffington

1. Dr. Buffington is a clinical pharmacologist and toxicologist who has practiced for about 35 years. Tr. 865-866; DX 20.

2. Dr. Buffington offered the opinion that, if the protocol is administered correctly, the current pattern of three-drug protocol in the sequence and doses that are administered will sufficiently reduce the level of consciousness to avoid severe pain. Tr. 867; DX 19.

3. Midazolam is a benzodiazepine, which is a central nervous system depressant agent that works on GABA. Tr. 868. GABA is one of the primary neurotransmitters and inhibitory transmitters in the brain. Tr. 868. Benzodiazepines all work on very similar mechanisms, but they do not all work in the same way. Tr. 868.

4. GABA is one of several types of neurotransmitters in the body. Tr. 882. When the GABA chemical is produced and is active at one of those neurotransmitters, it is a depressant. Tr. 882. Some studies discuss effects on the $GABA_A$ neurotransmitter in particular, but midazolam is affecting multiple types of neurotransmitters. Tr. 883.

5. Midazolam's clinical uses include anti-anxiety, sedation, unconsciousness, or muscle relaxation. Tr. 868. In clinical use, it can be administered through oral products, liquid products, injectable products, intramuscular products, or intravenous products. Tr. 868. Dr. Buffington has seen clinical dosages as high as 100 mg. Tr. 868.

6. Midazolam is administered in healthcare settings base on dosage ranges that correspond to body weight. Tr. 868-869. Larger doses are needed for heavier patients because of the volume of distribution, meaning that the larger volume of fluid in the circulatory system

means that a larger dose is needed to have the same effect. Tr. 884. The number of GABA receptors does not necessarily vary with weight even though the effects of a dose can vary with weight. Tr. 884.

7. The onset of action for midazolam is affected by the route of administration. Tr. 869. Oral administration is the slowest route for onset of action, while the most rapid is intravenous administration. Tr. 869.

8. Midazolam has dose-dependent effects, meaning that the effect increases depending on the dose administered. Tr. 869-870. The pharmacokinetics and pharmacodynamics of the drug as demonstrated during its development and the ongoing use in humans all demonstrate this effect. Tr. 869-870. Dose-dependent does not mean that the effect is linear, though, because not every drug behaves in a linear fashion. Tr. 870.

9. The drug monograph for midazolam indicates how midazolam works, including acknowledging that there are and have been serious adverse outcomes from its use in clinical practice. Tr. 871-872; DX 34. There are reports of midazolam having adverse outcomes, and even deaths, because like several other drugs, it is potentially lethal without cardiorespiratory support. Tr. 872.; DX 34 at 2.

10. Midazolam has a saturable pattern, but no one has ever demonstrated a ceiling effect. Tr. 876. The term "ceiling effect" means that there is a maximum amount that can be achieved from administering a product, whereas a saturable pattern or saturable nature means that the effect of the drug slows progressively with larger doses. Tr. 876, 881. In the literature Dr. Buffington has seen, and in the literature that Dr. Stevens cited and he reviewed, the

studies indicated a progressive slowing that demonstrates a saturable pattern, not a ceiling effect. Tr. 877.

11. The Miyake study supports Dr. Buffington's opinion on the effectiveness of midazolam. Tr. 877-878; PX 344. Chart A shows a dose-dependent effect at small doses with a saturable pattern, but it does not show any ceiling effect. Tr. 878; PX 344 at 6. That study also indicated that general anesthesia is possible even with BIS scores above 60 and that midazolam could sustain general anesthesia for 60 minutes with only an induction dose. Tr. 878-879.

12. Likewise, the Inagaki study supports Dr. Buffington's opinion on the effectiveness of midazolam. Tr. 879-881; PX 270. Figure 3 in that study shows a dose-dependent effect from midazolam because it shows greater effects being achieved from greater doses. Tr. 879-880; PX 270 at 4.

13. No study has demonstrated a ceiling effect to midazolam in part because there is no discernable way to measure the production rate of the GABA chemical and the ability of the drug to outpace the GABA chemical that is produced. Tr. 883. There is also no known way to discern the volume and the turnover rate at the cell. Tr. 883. Thus, opinions on a ceiling effect from midazolam are just guesswork. Tr. 883.

14. Midazolam has known toxic serum concentration ranges, with the actual toxic serum concentration varying based on an individual's medical conditions. Tr. 884-885. The "toxic" level is the point at which patients experience a substantial increase in adverse side effects. Tr. 885. Toxic effects are not necessarily fatal, nor are reported fatal ranges always

necessarily fatal. Tr. 885. In the case of midazolam, though, the toxic range is where severe outcomes occur, such as the respiratory depression. Tr. 914, 918.

15. Assuming an average adult patient of 70 kg (approximately 150-160 pounds), a dose as low as 21 mg would reach a toxic serum concentration range, meaning that if there were not cardiorespiratory support, the dose would be potentially lethal. Tr. 886-887. Thus, a 500 mg dose is many times the dose needed to trigger not only midazolam's sedative and amnestic effects but also trigger respiratory depression. Tr. 886-887.

16. The sedative effects of a drug are measured in terms of responsiveness to stimuli and ability to interpret those stimuli. Tr. 889. BIS is one commercial product for measuring sedation that is less common outside the operating room, and it is not an absolute determiner of whether the general anesthesia level of sedation has been achieved. Tr. 889.

17. A person's ability to perceive pain also decreases as sedation increases, meaning it is more of a progression than a stark contrast when a deeper level of sedation is achieved. Tr. 890.

18. The BIS scores are not included on the ASA levels of sedation (PX 496) because there is not an exact correlation between the two. Tr. 891. Nevertheless, it is generally understood that BIS scores of 40 to 60 correspond to general anesthesia. Tr. 891-892.

19. Midazolam has induced BIS scores within the general anesthesia range. Tr. 892; DX 49. In one study by Lui, doses of an average of 9 mg of midazolam were able to induce general anesthesia. Tr. 893; DX 49 at 3. In the left chart on page 3 of Liu, the study reports clinical responsiveness instead of BIS score, which is a more accurate measurement than the BIS score. Tr. 893-894.; DX 49 at 3. As shown on the chart, persons with BIS scores of about

90 and about 35 can have the same clinical responsiveness. Tr. 896. Thus, BIS score is a useful metric of measuring clinical responsiveness, but it is not determinative. Tr. 896. The data in Liu nonetheless indicates that increasing the dose beyond the approximately 5-13 mg used in the study would move the average BIS score below 60. Tr. 897; DX 49.

20. The data in Bulach also demonstrate that doses of midazolam as low at 10 mg can reach BIS scores as low at 66. Tr. 901; DX 37. The average score of 71 also indicates that studies of patients who are unconscious or not experiencing pain occur at levels that may not be general anesthesia, suggesting that general anesthesia is not necessary to avoid pain. Tr. 901; DX 37. Bulach also confirms midazolam's anterograde amnestic effects, which decrease a patient's ability to perceive pain during an event. Tr. 898-900; Def. Ex. 37.

21. The difference in pain between general anesthesia and deep sedation would be minimal, as patients in deep sedation may be more physically responsive to noxious stimuli, but that does not mean they are experiencing severe pain. Tr. 902.

22. Midazolam is not an analgesic drug because no anesthetic agent is an analgesic. Tr. 903. They are different classes of medication, and they effect perception of pain in different ways. Tr. 903. Midazolam affects perception of pain as an anesthetic, at higher doses. Tr. 904.

23. The Kang study, cited in Dr. Stevens's report, indicates that midazolam decreases the perception of pain even while physiologic responses are still possible. Tr. 904-905; DX 46 at 4153, 4156, 4159.

24. An injection of vecuronium bromide would not be painful aside from injection site reaction or discomfort. Tr. 902.

25. An injection of potassium chloride may or may not be painful in an awake person. Tr. 906. Slowing the rate of infusion has addressed pain issues for awake patients. Tr. 906-907.

26. Under deep sedation or further levels of anesthesia, an injection of potassium chloride would cause little pain if it caused any perceptible pain at all. Tr. 907.

27. Midazolam is approved by the FDA for use for general anesthesia. Tr. 907-908; DX 44 at 8, 21. It can be used alone for general anesthesia for approximately 60-90 minutes, but it is often mixed with other anesthetic agents when the procedure will take longer. Tr. 908-909, 911.

28. Induction of anesthesia means reaching a particular state of anesthesia, not being on a pathway toward it. Tr. 909-910. Maintenance of anesthesia means keeping a patient in the level of anesthesia they have already reached for a longer period of time. Tr. 910.

29. Midazolam is often not used for maintenance in clinical settings because it has a long emergence phase, meaning that patients take longer to return to consciousness. Tr. 911. Its problems as a maintenance agent do not limit its use to induce anesthesia. Tr. 912.

30. Contrary to Dr. Stevens's testimony, Dr. Buffington testified that midazolam's potentially fatal side effects, such as respiratory depression, can occur with or without the use of opioids. Tr. 913-914. This view is confirmed by the text of the black box warning in the FDA label, which lists both possibilities. Tr. 913-914; DX 44 at 2.

31. The FDA approval for general anesthesia means that midazolam reliably produces that level of clinical responsiveness, regardless of the BIS scores at issue. Tr. 916-917. The lack of FDA approval would not be determinative of midazolam's ability to reach

general anesthesia because off-label use is common, but the presence of that approval on the label is instructive. Tr. 916-917.

32. A 500 mg dose of midazolam would be sufficient to impose stronger sedative and amnestic effects than is seen in clinical practice for any patients sufficiently affected by clinical doses. Tr. 918-919. For patients who reach general anesthesia at lower doses, the larger dose would have the same effect. Tr. 919.

33. In response to Dr. Stevens' testimony regarding hyperalgesia, Dr. Buffington observed that it occurs in about 1% of cases and that it would be discernable during the consciousness check in Oklahoma's execution protocol. Tr. 920.

34. Contrary to Dr. Edgar's testimony, Dr. Buffington testified that IV fluids have similar pH ranges to midazolam and that many medicines administered by IV have similar pH ranges to midazolam, and he has never seen a report of flash pulmonary edema from the use of acidic medication. Tr. 920-921.

35. Pulmonary edema occurs with many medical conditions, and it causes labored breathing, while patients do not describe it as painful. Tr. 923. Dr. Buffington would expect pulmonary edema from the effects of all three drugs in Oklahoma's protocol, particularly from the difficulty in gas exchange as respiratory depression increases. Tr. 924-926. The inmate would not be experiencing pain by the time the pulmonary edema occurred, and the inmate would not experience it as painful even were he awake. Tr. 925-926.

36. Synthesis of a drug involves producing a raw drug product from other chemicals. Tr. 927. Compounding, in contrast, involves producing a usable formulation from

the raw product. Tr. 927. Dr. Sherman's testimony describes synthesis, not compounding. Tr. 928.

37. Dr. Buffington could compound pentobarbital, but he could not synthesize the active pharmaceutical ingredient needed to compound. Tr. 942-943, 949. He is aware of strong stipulations that make it difficult to acquire the active pharmaceutical ingredient. Tr. 946.

38. Compliance with USP797, which is often audited by a state board of pharmacy, ensures the sterility and product stability in a facility synthesizing drugs. Tr. 929. Facilities without the proper licenses are unlikely to be willing to synthesize the product as a result. Tr. 929.

39. Contrary to Dr. Sherman's testimony, no one should take any drug produced in the manner Dr. Sherman described by undergraduates with the training Dr. Sherman specified. Tr. 930. It would likely not be safe because it lacks the proper validation through certification and labs. Tr. 930.

II. Critique of expert testimony presented by Plaintiffs

A. Dr. Craig Stevens

1. Dr. Stevens's primary conclusions relate to the pain he believes that prisoners will experience when given the drugs in the Protocol, but he admits he is not an expert on "how consciousness relates to the human experience of pain or the awareness of pain." Tr. 82:15-17; *see also* Tr. 47:12-15. Unlike Dr. Antognini's research on general anesthetics, *supra* I.A., Antognini Summary at ¶ 1, Dr. Stevens's research has focused on the effect of opioids at the animal, cell, and molecular level, Tr. 81:24-82:3. And unlike Dr. Buffington, Dr. Stevens does not provide health care services to patients or advise physicians on drug treatment options, Tr. 81:15-19. Dr. Stevens's testimony on the alleged pain experienced by inmates in the protocol (and in his proposed alternatives) should be given relatively less weight than Defendants' experts.

2. To start, most of Dr. Stevens's testimony is premised on the assumption that, if midazolam is not able to achieve general anesthesia, the inmates will experience severe pain from the second two Protocol drugs. He claims this is because he believes that midazolam is not only unable to eliminate the experience of pain (general anesthesia), but it cannot reduce the pain experience either. Tr. 64:6-9, 74:19-21. But his testimony about this assumption reveals otherwise.

3. Dr. Stevens claims that midazolam is not able to reduce pain, relying on the Frolich and Von Delius studies. Tr. 64:10-66:10, 69:3-71:2. But he does not know the dose of midazolam studied in Frolich, and admits it produced only moderate sedation (inconsistent with the level of sedation all agree is observed in Oklahoma inmates), with lower blood

concentration levels than is seen in Oklahoma inmates. Tr. 89:4-91:23; PX 216 at 6185, 6189. (Moreover, although Dr. Stevens points out that Frolich observed hyperalgesia—increased pain—with low doses of midazolam, Tr. 70:9-12, Dr. Stevens admits this occurs with other general anesthetics as well, including the barbiturates he proposes as alternatives to midazolam. Tr. 119:13-22). Nor does he know the dosage used in the Von Delius study, and instead acknowledges that an opioid was also used in that study and the authors still found no pain relief—meaning that the study says little about midazolam's or opioid's abilities to reduce the experience of pain at large doses. Tr. 91:24-93:10 (discussing PX 473).

4. By contrast, one of the studies cited in Dr. Stevens' report (*see* PX 607 at 25 n.72) shows that midazolam at sufficient doses can in fact reduce the perception of pain. The Kang study discussed by Dr. Stevens shows that midazolam at levels sufficient for moderate or deep sedation reduced the subjective perception of pain intensity when the subjects were electrocuted. Tr. 93:13-98:3; DX 46 at 4153, 4156, 4159.

5. The results of the Kang study are consistent even with Dr. Stevens's own research, which showed that midazolam and other benzodiazepines have effects that reduce animal responses to painful stimuli, undermining Dr. Stevens's testimony to the contrary. Tr. 98:10-102:21; PX 490 at 19353; DX 87 at 1-3.

6. Thus, regardless of whether midazolam's effect of reducing pain perception is termed "analgesia" or "anesthesia," the studies cited, authored, and discussed by Dr. Stevens shows that midazolam can at sufficient doses reduce the perception of pain. His testimony included nothing other than low-dose studies to the contrary. So irrespective of whether midazolam can produce general anesthesia, midazolam producing unconsciousness at levels

of deep sedation—which Dr. Stevens agrees midazolam can achieved, Tr. 14:20, 47:16-17, 105:19-22—will reduce the experience of pain an inmate would otherwise have if he received the second two Protocol drugs without any anesthetic. Nothing in Dr. Stevens's testimony states that, at *that* reduced experience of pain, the level of pain experienced by inmates would be severe.

7. Indeed, while Dr. Stevens talks about the negative effects of vecuronium bromide on fully *awake* patients, Tr. 73:12-21, he acknowledges he knows nothing of the effects of a paralytic on someone sedated with a central nervous system depressant like midazolam, Tr. 136:12-137:17, 141:12-19. And so while he claims vecuronium bromide can cause panic and PTSD, Tr. 73:12-21, he acknowledges drugs like midazolam can be used to treat panic and PTSD, Tr. 16:6-10. He similarly does not have any evidence of the pain of potassium chloride experienced by someone sedated with midazolam or any other drug. Tr. 142:7-24. And he acknowledges potassium chloride would produce a quick death, with the heart stopping in 44 seconds. Tr. 150:24-151:3.

8. Even if general anesthesia—zero pain—was the requisite constitutional standard, Dr. Stevens's testimony does not establish that midazolam is unable to achieve that state. His testimony in this regard is based on his belief that midazolam has a "ceiling effect" below that of general anesthesia. To start, Dr. Stevens's testimony on this topic should be given little weight. His testimony on the dosage at which a ceiling effect for midazolam would be observed in other courts has been wildly inconsistent over the years and has been recognized by other courts as specious. Tr. 112:15-114:18. The Court should also give little weight to Dr. Stevens's testimony because he engaged in circular reasoning by, for example,

claiming that the mechanism of action (working with GABA) shows midazolam has a ceiling effect and he knows that there's a ceiling effect below general anesthesia because of its performance in studies, but also claiming that when its performance in studies shows it can achieve general anesthesia, he knows general anesthesia is not achieved because of its mechanism of action. Tr. 111:11-23, 129:1-14, 131:1-7. He also demonstrated an unwillingness to consider contrary scientific evidence as undermining his conclusions. Tr. 129:11-131:7. In any event, his testimony—looking to five pieces of evidence—fails to prove a relevant ceiling effect for midazolam.

9. *First*, Dr. Stevens believes that midazolam is not able to achieve general anesthesia, in part because the FDA label says its approved for "induction of anesthesia," which he believes to mean only the start of the process of achieving anesthesia. Tr. 17:24-18:15. But he admits he lacks the ability to interpret the words of the FDA label because he does not know what it means when it states the midazolam dose to "complete induction" of general anesthesia. Tr. 85:7-17; DX 44 at 21. Moreover, with respect to the drugs he claims *can* produce general anesthesia—barbiturates like pentobarbital and thiopental (pentothal)—he admits the labels also indicate approval only for induction, if even that. Tr. 87:86:15-89:3; DX 89 at 2; DX 90 at 2. And he admits that midazolam is classified as a general anesthetic, even by his own textbook. Tr. 60:7-61:8, 107:1-5.

10. *Second*, Dr. Stevens also claims that midazolam cannot achieve general anesthesia because of its "mechanism of action," namely, that it works alongside GABA in the body rather than also substituting for GABA. Tr. 29:19-30:4. GABA is the body's "major inhibitory neurotransmitter," the "greatest" one, and the body has "many, many" neurons that

release it and constantly produce it. Tr. 19:4-5, 20:3-9, 28:4-17. But he provides no basis for claiming that based on the amount of GABA in the body (an amount he does not know), GABA cannot when potentiated by midazolam produce a state of general anesthesia. Tr. 108:1-109:5; 111:8-22.

11. *Third*, Dr. Stevens points to the Bai paper, an in vitro (cellular) study of midazolam purporting to show a ceiling effect, Tr. 40:6-44:25, but he acknowledges that the study reveals nothing about the dose or level of consciousness that ceiling would occur in humans, Tr. 111:23-112:14.

12. *Fourth*, he points to a study of midazolam in dogs, Seddighi. Tr. 37:21-40:5. But he acknowledges that the study relates only to midazolam's effect on "nociception" as distinguished from pain. Tr. 116:1-23. And Seddighi itself noted the many studies showing midazolam's analgesic (pain-reducing) effects. Tr. 121:4-122:9; PX 428 at 8922. This study also reveals nothing about the dose or level of consciousness that ceiling would occur in humans.

13. *Fifth*, Dr. Stevens attempted to look to studies on humans. He starts by acknowledging that where a ceiling effect for midazolam might occur is "not clear because there has never been clinical studies that keep escalating the dose to see when a ceiling effect occurs." Tr. 30:20-24. He primarily relies on the Miyake study. Tr. 31:15-37:20. But Dr. Stevens claims only that Miyake "suggests a ceiling effect" or gives an "idea where it might occur." Tr. 30:25, 115:3-7. These concessions of speculation show Plaintiffs cannot meet their burden of proof to prove a sure or very likely risk of severe pain.

14. More importantly, as discussed above, the Miyake study actually shows midazolam's effectiveness at achieving general anesthesia. *See supra* I.C., Buffington Summary,

at ¶ 11; *see also* Tr. 655:15-658:7 (Antognini testimony). As Dr. Stevens acknowledges, Miyake showed that the effects of midazolam on the patients were to produce a state that meets the ASA definition of general anesthesia (no response after repeated stimulation as well as no awakening despite presence of noxious endotracheal tube), and Miyake itself characterizes the patients as being under "midazolam-induced general anesthesia." Tr. 123:3-128:8; PX 344 at 8306-07. Dr. Stevens instead relies on the BIS scores found in the study, Tr. 34:13-37:20, but acknowledges that many patients in the study has BIS scores below 60, which is the range consistent with general anesthesia, Tr. 128:11-129:5; PX 344 at 8311.

15. Dr. Stevens also noted that the Miyake study referenced two other studies that show midazolam does not reduce the BIS scores below 60. Tr. 34:13-35:6. But those studies, Dr. Stevens acknowledges, do not show a ceiling effect. One showed a reduction of BIS scores as midazolam was infused but did not continue to give more midazolam after a total of 0.3 mg/kg was infused over the course of ten minutes. Tr. 131:22-132:15. The other—Ibrahim—only gave a single-dose of 0.07 mg/kg with another drug to show that other drug's effect on midazolam, Tr. 132:16-134:12; PX 267 at 7772-73, so it did not in any way show midazolam's ceiling effect or its location.

16. The only other human study Dr. Stevens references is one showing the limited effects experienced by certain patients after they had overdosed on other benzodiazepines (not midazolam). Tr. 48:12-51:19. But these studies say little about the questions before the Court. To start, Dr. Stevens claims that midazolam no matter the dose cannot cause death, but acknowledges the FDA label's stern warning about the deadly effects of midazolam. Tr. 134:16-136:11; DX 44 at 2. More importantly, he acknowledges that those overdose studies

say little about the expected effects of a 500mg dose of midazolam because: (1) the studies showed the overdose patients were only slightly drowsy whereas the effects of 500mg midazolam on inmates is clearly far greater than that; (2) the studies were on oral, as opposed to injected, benzodiazepines; and (3) the patients were likely habitual users that had developed a tolerance to the drugs. Tr. 49:10-12, 51:4-19, 57:4-10; 138:8-140:8, 140:23-141:11.

17. Finally, Dr. Stevens proposes several alternative methods of execution. *See* Tr. 75:11-23, 80:2-16. He first proposes using a barbiturate like pentobarbital, preceded by an opioid like fentanyl, but he acknowledges that in prior cases he testified that pentobarbital used alone would cause a painless death. Tr. 143:9-147:19. He also recommends combining midazolam with an opioid, followed by potassium chloride, but acknowledges this combination of midazolam and opioid at the dosages he recommends has never been studied. Tr. 148:10-24. More importantly, he recently testified in Nevada that Nevada's protocol—similar to Dr. Stevens's but involving much higher doses of fentanyl and midazolam—would also result in severe pain. Tr. 153:19-155:15; DX 141 at 3, 23. Thus, his testimony fails to show this alternative would substantially reduce the risk of pain he alleges would occur with Oklahoma's protocol.

18. In any event, Dr. Stevens tacitly admits he has not done what is required under the second *Baze/Glossip* prong: "design a protocol" alternative to the one challenged. Tr. 152:15-153:2. Neither has any of the other Plaintiffs witnesses. For these reasons, Dr. Stevens's testimony fails to materially help meet Plaintiffs' burden to show either the first or second prongs of the *Baze/Glossip* test are satisfied.

B. Dr. Mark Edgar

1. Dr. Edgar is a pathologist specializing in bone and soft-tissue pathology, which involves diagnosing tumors, usually from microscopic surgical samples. Tr. 186:25-187:2, 189:16-24, 285:5-17. He performs autopsies only about once a month, Tr. 188:15, but very few of those are drug overdose deaths, Tr. 285:18-22. He is not a forensic pathologist, a profession that involves determining the cause of death. Tr. 190:5-12. He also is not an expert in the causes or symptoms of pulmonary edema, nor does he regularly diagnose, treat, or observe pulmonary edema. Tr. 285:23-286:8. Accordingly, his opinions on the topics in which he is not an expert and does not practice medicine should be given little weight.

2. His primary conclusion in this case is that, based on a review of autopsies of inmates executed by lethal injection, many of them have the physical signs of pulmonary edema. Tr. 192:23-193:22. But this finding is of limited relevance to whether inmates are very likely experiencing severe pain during their execution because: (1) pulmonary edema is a common autopsy finding, especially in drug overdose deaths, and is thus likely to occur regardless of execution method; (2) he does not know when pulmonary edema starts to form in inmates executed with midazolam, which means it could occur after inmates are made unconscious and unaware by the midazolam or even after death; (3) he does not know whether the inmates were conscious during any pulmonary edema; (4) he is not aware of any literature about the experience of a person with pulmonary edema while sedated with midazolam; and (5) he cannot tell from the autopsies whether the inmates were experiencing any pain or suffering from pulmonary edema. *See* Tr. 318:11-319:23.

3. *First*, the autopsy findings are unsurprising because pulmonary edema is found in "about 50 percent of all autopsies" and a common finding in drug overdose deaths. Tr. 201:2-12, 283:8-284:5. Indeed, Dr. Edgar has noted that pulmonary edema is also often present in executions with pentobarbital, one of Plaintiffs' proposed alternatives. Tr. 307:22-25. So the existence of pulmonary edema inmate autopsies is ultimately irrelevant to Plaintiffs' challenge to the use of midazolam, since that autopsy finding is likely to happen regardless.

4. *Second*, Dr. Edgar failed to rebut or prove false Dr. Antognini's testimony that pulmonary edema in inmates could be formed immediately prior to death or after death. *See supra* I.A., Antognini Summary, at ¶¶ 25-26. His sole basis for believing that the edema must be occurring prior to administration of vecuronium bromide is the presence of foam or froth in the airways in some of the autopsies, which he believes indicates that the inmate is still breathing during the edema. For this, Dr. Edgar relies on an experiment on dogs to show that respiration is necessary to form foam or froth in the lungs or airways. Tr. 276:13-278:12 (citing PX 816). But in that experiment, in the lungs that did not form foam, not only was respiration stopped, but also all the air was removed by collapsing the lung. Tr. 312:9-314:8 (citing PX 816 at 458). Thus, this study does not show that respiration is necessary for foam; it at most shows that air in the lungs is necessary for foam, and no one contends that inmates' lungs are collapsing during the execution. Thus, the study Dr. Edgar relies upon does nothing to disprove Dr. Antognini's studies showing that foam and froth can form post-mortem.

5. *Third*, even if any edema occurs before death, Dr. Edgar admits he does not know how long it takes for the pulmonary edema to develop after the injection of midazolam. Tr. 213:6-9, 278:24-279:3, 316:17-21. So he does not know if the midazolam rendered an

inmate unconscious or unaware of pain by the time any pulmonary edema begins. Tr. 317:7-318:10.

6. *Fourth*, even if an inmate were partially conscious or aware during any pulmonary edema after being injected by midazolam, Dr. Edgar offers no evidence that such inmates would be in severe pain. Although he testified concerning the typical symptoms of pulmonary edema in fully awake patients, Dr. Edgar has no knowledge of what a person sedated with a central nervous system depressant like midazolam would feel while undergoing pulmonary edema. Tr. 289:19-290:2. And he confesses that one cannot tell from an autopsy what symptoms a person was experiencing. Tr. 290:3-6.

7. *Fifth*, Dr. Edgar is also uncertain about the cause or mechanism of pulmonary edema in executed inmates. Tr. 249:17-250:13, 272:24-273:15, 281:8-13. He agrees with Dr. Yen, *supra* I.B., Yen Summary, at ¶¶ 32-34, that one potential cause is "negative pressure pulmonary edema," which would be the result of the sedating effects of midazolam causing the airway to be blocked. Tr. 267:2-268:25, 297:18-300:4. Thus Dr. Edgar admits the airway obstruction is caused precisely *because* the inmate is unconscious. Tr. 310:18-311:10. In other words, if this is the cause of the edema—and there appears to be agreement among the experts regarding at least this possibility—the inmate would not be aware of any pain or suffering from pulmonary edema caused by his lack of awareness.

8. He also admits that a halt in respiration, like that caused by vecuronium bromide, could cause pulmonary edema. Tr. 294:25-295:15. And it is possible that a central nervous system depressant stops the breathing, causing pulmonary edema. Tr. 308:5-11.

9. Dr. Edgar speculates that pulmonary edema could be caused by the acidity of midazolam (combined with its volume and rate of injunction). Tr. 271:1-8. His testimony provides no scientific basis for this hypothesis. This is perhaps a way to try to claim that the edema is taking place before midazolam's sedative effects—although Dr. Edgar conspicuously refuses to say as much.

10. Instead, Dr. Edgar admits this conclusion is not consistent with executions involving edema where midazolam was injected more slowly. Tr. 300:9-301:301:6. He also does not know what level of acidic concentration, volume, or rate of injection is expected to cause edema, nor is he aware of any studies showing midazolam can cause pulmonary edema through its acidity. Tr. 303:20-25. And he has observed pulmonary edema in present in executions *not* involving drugs as acidic as midazolam, including etomidate and Plaintiffs' alternative drug, pentobarbital. Tr. 307:22-310:17.

11. Dr. Antognini and Dr. Buffington refuted this testimony on the acidity of midazolam by explaining that the blood's "buffering" capacity will neutralize the acidity of the midazolam by the time it reaches the lungs, which is confirmed by the other injections of a similar acidity, injected clinically at a similar rate and volume as midazolam in the Protocol, and yet are not associated with causing pulmonary edema." *See supra* I.A., Antognini Summary, ¶ 27. I.C., Buffington Summary, ¶ 34. Dr. Edgar admits he has no idea what the acidity of midazolam mixed into the bloodstream would be by the time it reaches the lungs, especially given the body's buffering capacity to neutralize midazolam's acidity in the bloodstream, and has no basis to refute Dr. Antognini's testimony that the buffering capacity is sufficient for the blood-mixed-with-midazolam to reach normal bodily pH in inmates executed with

Oklahoma's protocol. Tr. 301:7-303:4. Thus, Dr. Edgar's acid theory as a cause of the pulmonary edema is both completely speculative and contradicted by all the scientific evidence in the record. As a result, it is highly unlikely, if not impossible, for any pulmonary edema found in executed inmates to have started prior to the anesthetizing effects of midazolam taking place.

12. *Sixth*, even if inmates were conscious of the pulmonary edema later found in their autopsies, the evidence is still insufficient to show they were sure or very likely in severe pain. Dr. Edgar acknowledges that the symptoms of pulmonary edema for someone alive and completely aware ranges from mild to severe, where mild edema involves merely "shortness of breath" and severe edema "a sense of panic, terror, drowning, [or] asphyxiation." Tr. 198:15-22. He acknowledges those experiencing mild pulmonary edema are not in severe pain and suffering. Tr. 286:14-19.

13. Dr. Edgar claims that a sign of "severe and acute" pulmonary edema is "froth coming out of the airways in the lungs" (meaning the trachea, bronchi, or bronchioles) combined with lungs that are "very heavy and very filled with fluid." Tr. 193:22-194:4, 199:7-12. 264:4-7. In his view, "pulmonary edema with **both** of those things" is "fulminant." Tr. 199:11-12 (emphasis added); *see also* Tr. 201:19-23, 290:10-19. While Dr. Edgar also testified that severe pulmonary edema is possible without froth in the airways, Tr. 262:15-23, he pointed to no other relevant signs that would affirmatively indicate severe edema without froth in the airways as opposed to merely not being able to rule out its possibility. *Cf.* Tr. 290:20-292:3.

14. Although Dr. Edgar claims the "vast majority" of inmate autopsies he reviewed show "severe" pulmonary edema, Tr. 282:13-283:1, he later admits that actually less than half involved froth in the airways, Tr. 293:15-294:18, which by his own methodology is how he tells that severe edema formed. Looking even more carefully, many of the inmates with froth in their airways did not have the other sign Dr. Edgar testified was necessary for a conclusion of severe pulmonary edema: very heavy and fluid-filled lungs. *See* PX 724 (describing autopsy findings for inmates Howell, Gray, McNabb, Morva, and Price). And Dr. Edgar acknowledges that during the executions, none of the inmates exhibited the typical outward signs of severe pulmonary edema. Tr. 286:20-287:18. By definition, then, severe pulmonary edema is not a "very likely" possibility with midazolam executions, even assuming inmates were alive and aware when the pulmonary edema later found in autopsies fully set in.

C. Dr. Michael Weinberger

1. Dr. Weinberger is a specialist in pain medicine, so has not regularly placed patients under general anesthesia since 1998, in contrast to the more-recent experience of Dr. Antognini and Dr. Yen. Tr. 362:7-24, 427:5-8. Unlike Dr. Antognini, he has done little to no research on general anesthetics. *See* Tr. 428:3-10. Accordingly, the Court should give relatively less weight Dr. Weinberger's testimony on general anesthetics and general anesthetic practice.

2. Dr. Weinberger testified regarding the efficacy of midazolam and its ability to prevent any severe pain and suffering from the second two Protocol drugs, as well as the appropriateness of Oklahoma's consciousness checks, but little of his cited evidence supports his strident conclusions.

3. Dr. Weinberger, for example, relies on the Haefely article to claim that benzodiazipines are not able to "induce an anesthetic state" because of a ceiling effect. Tr. 393:7-395:17 (citing PX 243 at 353, 358). But this article about effects seen "in a petri dish" was published before midazolam was even introduced to the market, *see* Tr. 446:20-23, 460:16-461:16, provides no data (or even citation) to justify the statements Dr. Weinberger relies upon, and is interpreted by Dr. Weinberger to justify his view that midazolam is unable to induce anesthesia in a manner contradicted by midazolam's FDA label itself, *see* DX 44 at 8, 21.

4. Dr. Weinberger's reliance on articles that mention ceiling effects in passing—but don't actually provide any data showing a ceiling effect or where it occurs—is chronic. For example, he cites the Majumdar article, but that article did not seek to measure any ceiling

effect or provide any data thereon, Tr. 461:15-23, and instead, as Dr. Weinberger states, it was about midazolam and "postoperative nausea and vomiting," Tr. 400:1-16. *See also* PX 67.

5. Dr. Weinberger also cites the Gamble study where patients given increasing doses of midazolam became more reliably sedated. Tr. 402:22-405:16 (citing PX 219 at 870). Contrary to Dr. Weinberger's suggestion that this shows a ceiling effect, he admits that as the dose increase there is an increased effect, even if "there's not much difference"—which is the opposite of a ceiling effect. Tr. 405:12-16; *see also* PX 219 at 870. And although in this very early study midazolam did not reliability abolish the eyelash reflex, in other studies (including those Weinberger relies upon), midazolam reliably induced anesthesia as measured by the eyelash reflex and other stimuli. *See* Tr. 444:7-445:16 (discussing DX 35 at 1117); PX 395 at 211-212 (defining induction of anesthesia as "loss of lid reflex and failure to respond to oral commands and at Table III showing 100% of those given 0.2 mg/kg of midazolam were induced); *see also* Tr. 499:19-450:11 (discussing PX 344). At best, then, the Gamble study is an outlier. And of course, to the extent an inmate still remains conscious after midazolam, the robust consciousness checks used by the IV Team Leader (far more robust than the eyelash test) would catch that rare occurrence.

6. Similarly, Dr. Weinberger points to the Inagaki study, Tr. 406:5-409:13, but even the portions of the study he points to show an increasing anesthetic effect of midazolam as the dose increases, without ever actually reaching a ceiling, *see* PX 270 at 616. So while Dr. Weinberger says this data implied that "at some point, they expect that it would no longer have an effect" with an increased dose of midazolam, Tr. 409:7-13, Inagaki never actually reached that point and—more importantly—Inagaki provides no basis to believe that the

point arrives before a person is in a state of general anesthesia. *See also* Tr. 789:1-790:15 (Antognini testimony on Inagaki); Tr. 979:18-981:21 (Buffington testimony on Inagaki). Dr. Weinberger eventually conceded that at most Inagaki shows only that the effects of midazolam are "dose-related" but "it did *feel* like there *could* be a ceiling or saturation effect." Tr. 453:3-12 (emphasis added). Such speculative feelings fail to meet Plaintiffs' burden of proof.

7. Similarly, Dr. Weinberger cites the Miyake study for its data "suggesting" where a ceiling effect may occur, Tr. 401:3-402:21, 451:5-11, but for the reasons explained above, that article proves that midazolam is an effective general anesthetic rather than proving that it has a ceiling effect preventing its ability to produce general anesthesia, *see supra* II.A., Stevens Critique, at ¶¶ 13-15. Moreover, Dr. Weinberger's suggestion that midazolam has a ceiling near 0.2 mg/kg is belied by his own reliance on Inagaki, discussed in the paragraph above, which shows the increased effects of midazolam beyond 0.2 mg/kg when doses are raised to, for example, 0.6 mg/kg. *See* Tr. 451:22-452:20.

8. Dr. Weinberger also relies on the chapter authored by Vuyk in *Miller's Anesthesiology*, pointing out its statements concerning midazolam's use for anxiolysis and amnesia, implying that it cannot be used for anesthesia. Tr. 397:1-21. But he neglects to mention that midazolam is included in a chapter on "intravenous anesthetics," and states: "Midazolam is the benzodiazepine of choice for induction of anesthesia," providing the "induction dose of midazolam" at "0.3 mg/kg in unpremedicated patients" and stating "[t]he onset of anesthesia is within 30 to 60 seconds." PX 474 at 658. Indeed, elsewhere Dr. Weinberger admits midazolam is an anesthetic. Tr. 392:10-11.

9. Dr. Weinberger then attempts to minimize this reality about midazolam's ability to induce general anesthesia (which is also reflected on midazolam's FDA label), but his testimony on this score is confused and confusing. *See* Tr. 397:23-399:3; *see also* Tr. 436:12-437:1. He acknowledges "induction" involves taking an awake person and putting them "to the state of general anesthesia," Tr. 398:2-4, 437:24-25, but then conflates that state with the "maintenance" of that state, Tr. 398:11-15. He claims that the state of general anesthesia is not possible because midazolam is not an analgesic, Tr. 398:19-399:3, but he also acknowledges that barbiturates *can* induce and maintain general anesthesia, *see* Tr. 395:11-17, 415:7, and provide "analgesia" only because of their effects on the central nervous system (which is the same system effected by midazolam), *see* Tr. 441:6-442:24. In other words, his testimony appears deliberately obscurantist about anesthesia and analgesia, as well as induction and maintenance.

10. Turning to the alleged pain involved in the Protocol, Dr. Weinberger hinges his testimony that the Protocol will result in severe pain on the belief that central nervous system depressants like midazolam operate as a binary: either they prevent all pain awareness (general anesthesia) or prevent none at all, ignoring the spectrum of states and reduced awareness of pain in between (like deep sedation).

11. For example, Dr. Weinberger attempts to buttress the opinions of Dr. Edgar by adding *ipse dixit* that inmates not under general anesthesia would have "severe sensations of suffocation" from pulmonary edema, Tr. 373:11-24, but offers no evidence to prove that an inmate would experience such sensations even if they were only deeply sedated (as opposed to under general anesthesia) by midazolam.

12. Dr. Weinberger testifies about the experience of paralysis by vecuronium bromide while not sedated as causing "extreme anxiety," Tr. 369:14-20, 371:4-7, but he admits that midazolam is an anti-anxiety drug and that he himself has used the drug to reduce the suffering from anxiety, Tr. 381:21-23, 428:25-430:24; *see also* Tr. 467:1-5. Thus, his reliance on studies like the one authored by Thomsen, Tr. 370:1-371:7 (citing PX 77), are inapposite since they involve patients where "the anesthetic agents are removed," Tr. 370:10-13. He cites no study, by contrast, involving any negative effects of vecuronium bromide soon after the administration of a large dose of a central nervous system depressant like midazolam or any other benzodiazepine.

13. Although Dr. Weinberger notes that potassium chloride can be painful in awake patients he has treated, he specifies that the pain is only "at the site of the infusion or in the extremity in which the intravenous … where the potassium was being administered." Tr. 365:16-366:14. So there is no evidence that a potassium chloride injection, even in an awake person, would cause severe pain throughout the body or the equivalent of being burned alive. And because Dr. Stevens admits that potassium chloride will produce a quick death, *see supra* II.A, Stevens Critique, ¶ 7, at most potassium chloride would produce local pain for less than a minute before the heart stopped.

14. More to the point, however, Dr. Weinberger provides no evidence on the level of pain experienced by those administered potassium chloride when deeply sedated with midazolam or any other central nervous system depressant. (He acknowledges midazolam can produce deep sedation. Tr. 436:10-11.). And he offers no literature to justify his belief that potassium chloride would be a more painful stimulus than a sternal rub. Tr. 474:4-15.

15. Dr. Weinberger also testified much about consciousness checks, but that testimony hardly proves Plaintiffs' case. For example, he emphasizes the importance of the "oculocephalic reflex" to test for consciousness, Tr. 379:6-17, but admits that during the stages of his career he was placing patients under general anesthesia, this technique was not used to check for consciousness, Tr. 415:3-16, 469:19-25. He relies principally on the Brown chapter for this position, but that source also endorses the use of "total body pinches, nail bed pinches, and sternal rubs." *See* PX 63 at 1281. Dr. Weinberger himself concedes the legitimacy of using sternal rubs as an effective tool to check whether a person is deeply comatose or in a state of general anesthesia. *See* Tr. 471:15-473:23.

16. Dr. Weinberger also seems to claim that a consciousness check must involve the same level of pain as the stimulus to be used after the unconsciousness is confirmed. *See* Tr. 387:13-388:1, 423:6-424:9. But that is obviously not the case: he himself never, for example, cut into bone as a consciousness check before doing a surgery that involved cutting into bone. Indeed, it does not appear he has ever used painful stimulation as a consciousness check. *See* Tr. 415:3-16. Dr. Weinberger also pointed to the consciousness checks performed during the Lockett execution, Tr. 424:12-426:9, but even putting aside the *sui generis* I.V. issues of the Lockett execution, the physician there may have in fact performed the consciousness checks that Dr. Weinberger recommends like the oculocephalic and corneal reflexes: "I blow in his eyes" and "I check his eye movement," Tr. 425:23-25, 469:1-7.

17. Dr. Weinberger also at times emphasizes and at times de-emphasizes the importance of monitoring heart rate and blood pressure, *see* Tr. 377-79, 416, but under the Protocol the IV Team Leader in fact has continual access to heart rate and blood pressure

monitors. And in the recent Oklahoma executions, those monitors showed no dramatic spike in heart rate during the execution. *See supra* I.B, Yen Summary, at ¶ 60. Even so, despite his repeated testimony about the necessity of putting the brainstem (which governs autonomic responses like heart rate and blood pressure) "to sleep," he acknowledges that such autonomic responses do not necessarily imply pain. Tr. 433:9-17.

18. Dr. Weinberger also covers studies showing the incidents of anesthetic awareness during surgery, Tr. 410:10-419:4—which according to him occurs about 1% of the time, Tr. 414:7-9—but none of these studies used midazolam and, in any event, it is not clear why the rare failures of modern surgical practices are relevant to this case. Indeed, the study Dr. Weinberger relies upon found that anesthetic awareness was *less likely* when anesthesia was by intravenous drugs only (like as in the Protocol) than with a combination of intravenous and inhaled drugs. *See* PX 405 at 968.

19. For these reasons, Dr. Weinberger's testimony does little to advance Plaintiffs' case.

D. Dr. Gail Van Norman

1. Dr. Van Norman was asked to provide an expert opinion on "whether the prisoners that had been executed by the Oklahoma protocol . . . likely experienced extreme pain and suffering during the executions process." Tr. 487:21-25. Her conclusory statements about extreme pain are unsupported by the evidence. Indeed, Dr. Van Norman's expert testimony, at times, seems circular in logic. For example, she knows that Donald Grant "suffered severe pain and suffering," Tr. 567:16, because in her opinion "there's nothing about midazolam that would prevent him from perceiving pain," Tr. 567:21-22. Her opinion is based upon assuming a fact highly disputed and central to this case.

2. To further support her statements on experiencing pain, she attempts to link consciousness to attempts to breath. *E.g.*, Tr. 567:25 (Donald Grant attempted to breath "all the way up until the time he was paralyzed"). The Court immediately observed this logical fallacy. Tr. 568:6-9 ("I assume in your clinical practice, you see insensate patients breathing all the time; is that right? . . . Yes, I would say so."). She ultimately admits that her opinion on consciousness is based on her opinions of the nature of the drugs, and not of any breathing pattern observed. Tr. 569:7-16.

3. Similarly, Dr. Van Norman believed that John Grant's "rocking boat" motion due to an airway obstruction was a sign he was awake, Tr. 499:18-500:3, 501:14-17, but as Dr. Yen testifies—who, unlike Dr. Van Norman, actually witnessed this execution—a person would only have an involuntary airway obstruction in this context if they were not conscious, *see supra* I.B., Yen Summary, ¶¶ 23, 41. Her testimony on Postelle allegedly being in pain because his airway was obstructed is thus similarly unpersuasive. Tr. 575:24-576:5.

4. Dr. Van Norman also believes that John Grant was conscious because she thinks his vomiting was active and propulsive based on after-action scene photos, Tr. 502:9-504:14, but witnesses to the execution like Dr. Yen and Justin Farris confirm that the regurgitation was passive and not propulsive, *see supra* I.B, Yen Summary, ¶¶ 43-46; *infra* III.A., Farris Proposed Findings of Fact, ¶¶ 81-82.

5. Dr. Van Norman also pointed to various small movements of the prisoners after the midazolam was administered as a sign of consciousness. *See, e.g.*, Tr. 521:19-522:6, 594:10-596:8. But as every other expert anesthesiologist testified—including Plaintiffs' expert Dr. Weinberger—movements are common during general anesthesia. *See* Tr. 439:14-18; *supra* I.A., Antognini Summary, ¶ 20; I.B., Yen Summary, ¶ 24.

6. When asked about consciousness checks, Dr. Van Norman feels that "[t]he consciousness checks that are being performed in these executions can't . . . show whether an inmate is conscious or not." Tr. 605:25-606:1. But Dr. Van Norman also claims that no consciousness checks are sufficient because, even in a clinical setting, her own patients may be conscious when they should not be. Tr. 606:9-607:7. But one of those consciousness checks is verbal, and that a "part of a standard consciousness check includes a loud verbal stimulus. And when we use it with patients, this would be a very loud verbal stimulus . . . ." Tr. 493:9-13.

7. Contrary to accepted practice and the testimony of other experts, *see supra* I.A., Antognini Summary, ¶¶ 18, 34; I.B., Yen Summary, ¶¶ 27, 58, Dr. Van Norman insists that a sternum rub requires someone "to hold it and continue it for a full 30 seconds" Tr. 602:15-16. Moreover, her testimony on the inadequacy of the sternum rub for John Grant based on

after-execution photos of the execution gurney straps, Tr. 528:13-530:1, is contradicted by eyewitnesses to the execution itself, including Justin Farris, *see infra* III.A, ¶¶ 110-111.

8. To the extent the Court considers topics of her testimony previously excluded, Plaintiffs' expert provided generalized midazolam testimony and stated that she has extensive experience with benzodiazepines. Tr. 486:12-13. She further implies that they can be used in high doses as a part of a of the general anesthesia regime. Tr. 486:15-17. She immediately disclaims that nobody would use midazolam "for a significantly painful procedure," but then couches that statement by clarifying "[i]t's not capable of *keeping* someone under general anesthesia." Tr. 487:3-5 (emphasis added).

9. Dr. Van Norman witnessed one execution. Outside of that, she only reviewed the accounts of others and the EKG strips for all four executions. A large portion of her testimony was dedicated to analyzing those strips in great detail. *See* Tr. 505-21; 536-54, 561-63, 579-92. This testimony is offered despite her own admission that there was very little information that could be determined through analyzing those strips. *See* Tr. 615:14-25, 616:1-17.

10. The only thing regarding consciousness that Dr. Van Norman could ascertain from the strips is that the strips do not preclude consciousness. That is to say, the strips do not indicate one way or another if any of the inmates were conscious. Tr. 617:1-3 & 9-12. Thus, her conclusion that the inmates suffered "extreme pain and suffering through the execution process," is speculative at best. Tr. 488:2-3.

E. Dr. David Sherman

1. Dr. Sherman testified about the feasibility of synthesizing sodium thiopental or pentobarbital. But his testimony does little to show that Plaintiffs' proposed alternatives are available to Defendants because Dr. Sherman failed to investigate, much less prove, either the availability or willingness of any properly licensed laboratory to produce either drug for use in lethal injection. Tr. 178-183.

2. Dr. Sherman only found literature regarding the synthesis of sodium thiopental, and he did not find any literature addressing his method of synthesizing pentobarbital. Tr. 177.

3. Dr. Sherman has never performed either synthesis he described in his testimony. Tr. 174.

4. Dr. Sherman testified that a person of skill in the art to synthesize sodium thiopental or pentobarbital would include college sophomores, as anyone with training in organic chemistry and 1-2 years of lab experience is qualified in his view. Tr. 164, 176.

5. Dr. Sherman acknowledged that an organization manufacturing a drug for human consumption would have to comply with good manufacturing processes ("GMP"), which involves guidelines and standards for assuring the manufacture of a drug of suitable purity and quality. Tr. 175. Dr. Sherman admitted that his research lab could not perform the synthesis he described to the standards necessary for human consumption because the lab did not have GMP capabilities. Tr. 175, 185.

6. Dr. Sherman testified that the University of Oklahoma, the Oklahoma-based Advance Research Chemicals, and the Michigan-based AAPharmasyn were able to perform

the synthesis he described, but he did not investigate whether any of them complied with GMP. Tr. 179-180, 183.

7. Dr. Sherman testified that both pentobarbital and sodium thiopental are controlled substances under federal law and that the license for the manufacture of controlled substances is available from the DEA. Tr. 178. But Dr. Sherman failed to investigate whether the University of Oklahoma or Advance Research Chemicals had a license from the DEA, and he was only able to testify that AAPharmasyn has that license. Tr. 178-80.

8. Dr. Sherman failed to investigate whether the University of Oklahoma, Advance Research Chemicals, or AAPharmasyn has a federal license for the manufacture of pharmaceuticals from the U.S. Food and Drug Administration (FDA). Tr. 178-181.

9. Dr. Sherman failed to investigate whether the University of Oklahoma, Advance Research Chemicals, or AAPharmasyn has a state license for the manufacture of pharmaceuticals. Tr. 178-181.

10. On reviewing AAPharmasyn's list of licenses that included solely a state research laboratory license for controlled substances, DX 95, and not a DEA license or a federal or state manufacturing license, Dr. Sherman admitted he is unable to explain whether a research license is different than a manufacturing license despite his earlier testimony about operating a research lab. *Compare* Tr. 182-183, *with* Tr. 162, 175. Dr. Sherman denied familiarity with the distinction he had just explained earlier because the license list undermined his testimony that AAPharmasyn was an available laboratory to synthesize pentobarbital or sodium thiopental.

11. Dr. Sherman failed to investigate whether the University of Oklahoma would be willing to lend its labs for the synthesis he described or whether Advance Research Chemicals or AAPharmasyn would be willing to perform the synthesis he described. Tr. 179-180, 183. Thus, his investigation failures included not only whether any of the labs were properly licensed but also whether they were willing participants in synthesizing lethal injection drugs even if they had the proper licenses. As Justin Farris testified, those labs are not in fact willing to synthesize lethal injection drugs for DOC. Tr. 1005.

12. In sum, Dr. Sherman's testimony fails to establish the availability of any properly licensed and GMP-compliant lab that is willing to synthesize pentobarbital or sodium thiopental for use in lethal injection.

F. Dr. Lawrence Block

1. Dr. Block offered nothing relevant to the case because his testimony addressed the ability of compounding pharmacies to compound raw materials into usable form for executions, and Mr. Farris testified that he knows compounding pharmacies that would compound execution drugs if he had the raw materials. *Compare* Block Depo. Designations, *with* Tr. 1006-1007; *see also supra* I.C., Buffington Summary, at ¶¶ 37-40. However, Oklahoma is unable to obtain the raw materials for compounding pentobarbital or sodium thiopental.

G. Dr. James Williams

1. Dr. Williams's testimony on the firing squad relies on his dubious opinion that all gunshot wounds are not painful for some time. Tr. 340, 344. He believes the painless feeling could last hours or even days. Tr. 347.

2. Dr. Williams testified that it is unclear how much pain would result from injury to the ribs or the sternum from gunshot wounds. Tr. 345-346. He does not recall any gunshot wound patients mentioning rib or sternum pain, but he did not otherwise investigate for rib or sternum injuries with his gunshot wound patients. Tr. 349.

3. Dr. Williams has never witnessed anyone shot in the chest, nor has he treated a chest gunshot wound within 10 to 15 seconds, let alone within the first minute. Tr. 347. He has also never treated a patient who had five gunshot wounds to the chest. Tr. 347.

4. Dr. Williams testified that pleural pain would be a burning or tearing sensation. Tr. 348. He denied that his injury with a .22 Rimfire to the outer pleura was painful, but he did not offer any examples of a patient suffering injury to the pleura around the lungs, instead merely denying any patients mentioning pleural pain. Tr. 349.

5. Dr. Williams admits that Army medics use pain medicine in the field despite his testimony that non-lethal gunshot wounds observed by his Army medic friends were not painful. Tr. 349.

6. Dr. Williams also believes that gunshot wounds cause ventricular fibrillation that leads to rapid unconsciousness. Tr. 332-33. But his testimony on when that rapid incapacitation would occur was inconsistent, as explained below.

7. Dr. Williams believes both that the caliber of the rifle is relevant to its effectiveness in rendering someone quickly unconscious after being shot by a firing squad, Tr. 352, but contradictorily testified that any rifle bullet is effective for incapacitation, without comment on caliber, Tr. 356.

8. When confronted with the wound ballistics literature stating that handgun wounds only cause incapacitation in 10% of wounds because of the precise target that needs to be hit, DX 13 at 5, Dr. Williams distinguished the article based on his assumption that the article was only discussing smaller caliber handguns. Tr. 356-357. He was familiar with the article, but he never investigated whether the sources cited by the author were limited to service caliber handguns, choosing instead just to make that assumption. Tr. 357. Dr. Williams offered no explanation of how the incapacitation rate could still be 10% if the article included .357 magnum or .44 magnum gunshot wounds. Tr. 357.

9. Dr. Williams does not recommend any particular protocol for firing squads. Tr. 349. Thus, in contrast to the midazolam and pentobarbital alternatives where Plaintiffs presented evidence of their particular desired alternative through an expert's recommendation, Plaintiffs failed to assert any particular firing squad protocol as their alternative. The effectiveness of protocols that are theoretically available, without any assertion of a particular protocol by Plaintiffs or their experts, does not suffice for selection of an alternative. *See* Doc. 542 at 9-10 (Tymkovich, J., dissenting); *see also* Doc. 546 (summarily reversing the Tenth Circuit).

10. Dr. Williams believes that anything fewer than four bullets "would be flirting with a potential botched execution," but while he observed that the old U.S. Army protocol

used six live rounds, he did not express a preference on what number of rifles is needed beyond the minimum of four. Tr. 350.

11. Dr. Williams admits that incapacitation does not occur in some firing squad executions he has reviewed. Tr. 351-353. He believes the lack of incapacitation was intentional in some and does not have an explanation for others. Tr. 351-353.

12. Dr. Williams testified that the accuracy percentage for law enforcement in Oklahoma is 72%, Tr. 360, which creates the possibility of missed shots in firing squad executions.

III. Proposed Findings of Fact of fact witnesses[1]

A. Justin Farris

1. Justin Farris is the Chief of Operations for the Oklahoma Department of Corrections, with almost 23 years of experience working for the DOC. Tr. 985.

2. Mr. Farris was the H-Unit Section Chief for the executions of John Grant, Bigler Stouffer, Donald Grant, and Gilbert Postelle. Tr. 986; 1/10/22 Tr. 178. As part of that role, he is present in the chamber throughout the execution. Tr. 986; 1/10/22 Tr. 178.

3. As the assigned H-Unit Leader, Mr. Farris also participated in the trainings for all four executions. Tr. 991, 994. Trainings were conducted throughout about 26 training days involving approximately 119 scenarios from July of 2020 through February of 2022. Tr. 993-994; DX 63-80. Mr. Farris attended all but one. Tr. 994. As an execution draws near, members of the IV Team participate in the trainings. Tr. 994; *e.g.*, DX 78 at 1; *see also* 1/10/22 Tr. at 200-201. A single training day involves multiple scenarios. Tr. 994-995. All execution team members are able to suggest scenarios for training. Tr. 995.

4. Mr. Farris was personally involved in verifying the execution drugs for all four executions. Tr. 995-996; *see also* 1/10/22 Tr. 192, 202-203. The drugs used in the executions were midazolam, vecuronium bromide, and potassium chloride. Tr. 996. Mr. Farris signed the list of drugs on the Postelle correctional service log after verifying the drugs in that execution. Tr. 999-1000; DX 160 at 1. Mr. Farris could not and would not proceed with an execution if the drugs were not correct during the verification process. Tr. 1000.

[1] Dr. Antognini and Dr. Yen both witnessed executions and offered factual testimony at trial, which Defendants detailed in *supra* Section I.

5. Mr. Farris participated in the after-action review of the Postelle execution. Tr. 998. During that review, he learned that rocuronium was written on the EKG strip and that there was a sticker label right below the syringes with rocuronium written on it. Tr. 998, 1024; PX 837 at 022460. The syringes for the Postelle execution were correctly labelled, while the board was not. Tr. 1030-31; PX 837 at 022460. The sticker on the syringes is what tells execution team members what drug they are pushing. Tr. 1030.

6. Mr. Farris verified that all employees who participated in five different inventories of the drugs for the Postelle execution confirmed that vecuronium was used and not rocuronium. Tr. 998. Thus, the use of rocuronium on the EKG strip was a transcription error from the board and vecuronium was used. Tr. 998, 1024.

7. Mr. Farris supervises the process for obtaining execution drugs. Tr. 1000. While DOC has a source for midazolam for use in executions, Mr. Farris is still actively looking for, but has been unable to obtain, a source for pentobarbital. Tr. 1000.

8. Mr. Farris was unable to obtain any execution drugs from DOC's contracted pharmacy for pharmaceuticals, Diamond Pharmacy. Tr. 1001, DX 158. It could not provide any drugs in DOC's protocol, including pentobarbital or sodium thiopental, and it also could not provide fentanyl. Tr. 1001-1002. The list of drugs attached to Diamond Pharmacy's rejection letter names several companies and drugs under a "prison facility exclusion" or "prison restriction," indicating products Diamond cannot sell to DOC due to those drugs being used in executions. Tr. 1002-1003.

9. Mr. Farris also supervised the contacts with pharmacies in the state in order to obtain pentobarbital. Tr. 1003. The goal was to contact roughly 10% of the pharmacies in the State. Tr. 1003. None of those contacts were successful in obtaining pentobarbital. Tr. 1004.

10. Mr. Farris also supervised contacts with other states to obtain pentobarbital. He knew of contacts with seven different states, none of which resulted in a source. Tr. 1004.

11. In addition, Mr. Farris supervised attempts to learn the pentobarbital source for the federal government. Tr. 1004. He was able to determine who the source was and to contact them. Tr. 1004. They were initially receptive to selling to him, but in the end, they ultimately said "no" to his efforts to order pentobarbital. Tr. 1004.

12. Mr. Farris supervised attempts to contact labs to obtain pentobarbital as well, understanding raw materials from any labs then have to be taken to a pharmacy to be compounded into a usable form. Tr. 1005-1006. Mr. Farris knows compounding pharmacies that would be willing to compound pentobarbital for use in executions if he was able to obtain a supply of the raw material, but neither he nor the compounding pharmacies that are willing to assist have a supply of the raw material. Tr. 1006-1007.

13. Mr. Farris's contacts with labs included Advance Research Chemicals and AAPharmasyn. Tr. 1005. Those were two labs recommended by Dr. Sherman. *See supra* II.E., Sherman Critique, ¶ 6. Neither lab was willing to supply DOC with any execution drugs. Tr. 1005. AAPharmasyn in particular cited the lack of a DEA license when refusing to provide a supply. Tr. 1005. No labs that Mr. Farris contacted were willing to sell any execution drugs. Tr. 1005. Mr. Farris also contacted the University of Oklahoma about using their labs. Tr. 1005. He was unsuccessful in obtaining their agreement. Tr. 1005.

14. Mr. Farris witnessed all four recent executions in Oklahoma from inside the execution chamber. John Grant's execution was scheduled to being at 4:00pm in the evening of October 28, 2021. 1/10/22 Tr. 179; *see also* DX 1 (showing date of execution).

15. John Grant was served the meal designated as his last meal around 5:13pm the day before his execution. 1/10/22 Tr. 181; DX 5. Nevertheless, he was still eating at 3:15pm the day of his execution. 1/10/22 Tr. 181; DX 5. The food consumed right before his execution was chips and soda from a large bag of potato chips and a 2-liter bottle of Pibb Xtra. 1/10/22 Tr. 181-182; DX 3 at 019416.

16. Mr. Farris directed the restraint team to obtain the inmate for the execution around 3:15pm, the same time that he last consumed food. 1/10/22 Tr. 181-182.

17. Once John Grant arrived in the execution chamber, Mr. Farris advised the director that he was ready for the IV team. 1/10/22 Tr. 183-184. John Grant was very disruptive and upset during this time, preventing Mr. Farris from fully explaining the process to him. 1/10/22 Tr. 183.

18. Next, the doctor and the nurse in the IV Team entered to set the IVs. 1/10/22 Tr. 184. They took about five minutes to locate sites for the IV lines, and they were able to locate sites and set IVs in less than 10 minutes. 1/10/22 Tr. 184.

19. Mr. Farris and the inmate waited together in the execution chamber until around 4:08 or 4:09pm, when the execution began. 1/10/22 Tr. 185. Mr. Farris read the warrant, and John Grant was cursing and yelling at the top of his lungs. 1/10/22 Tr. 186. After Mr. Farris finished reading, DOC cut the mics instead of allowing further time for last words because John Grant was getting out of control with his ongoing cursing and yelling. 1/10/22 Tr. 186.

20. Mr. Farris observed the first drug being pushed through the IV lines, and during that time, he continued watching the IV site, 1/10/22 Tr. 186-187. Once he noticed the drug being pushed, he also noticed changes in John Grant. 1/10/22 Tr. 187. He recalled John Grant was very agitated and flexing his arm, but after a few seconds of the drug flowing, John Grant made a noise with his mouth and completely relaxed. 1/10/22 Tr. 187.

21. After it appeared John Grant was asleep, he vomited a thin, light brown vomit. 1/10/22 Tr. 188. Mr. Farris did not believe it was convulsions because the extremities still were not tightening, but he did use the intercom to ask for someone to come in to address the vomit. 1/10/22 Tr. 188. The IV team then entered, cleaned up John Grant with a towel, and turned his head to the side a little bit. 1/10/22 Tr. 188.

22. More vomit came up after they left. 1/10/22 Tr. 189. The vomit during the reached the furthest points depicted in medical examiner photos by falling off the bed and running out along the floor from where it first landed from the bed. Tr. 990-991; PX 37 at 190. Photo 199 accurately depicts the gap where vomit fell of the bed before moving throughout the floor. Tr. 991; PX at 199.

23. After the second round of vomit, the doctor re-entered alone. 1/10/22 Tr. 189. Mr. Farris observed the IV Team Leader perform consciousness checks on Donald Grant. 1/10/22 Tr. 189. The doctor performed a sternum rub, in which he rubbed his knuckles very hard on the sternum, raised the eyelids, and cleaned up additional vomit. 1/10/22 Tr. 189.

24. The sternal rub that Mr. Farris observed during the John Grant execution occurred above the buckle. Tr. 990. The buckle is located just below the sternum. 1/10/22 Tr 190. Thus, the sternal rub did not occur below the buckle. Tr. 1013.

25. Mr. Farris was notified through a knock on the door that the inmate was unconscious, as he knew from training what the knock meant. 1/10/22 Tr. 191. The second and third drugs in the protocol were administered, and then the IV Team Leader came back into the execution chamber. 1/10/22 Tr. 191.

26. On the second time the IV Team Leader entered the chamber, he checked the pupils. 1/10/22 Tr. 191. The IV Team Leader exited and Director Crow entered to announce the time of death. 1/10/22 Tr. 191-192.

27. Bigler Stouffer's execution was scheduled to begin at 10:00am on the morning of December 9, 2021. 1/10/22 Tr. 192; *see also* DX 2 (showing date of execution).

28. Once Stouffer arrived in the execution chamber, Mr. Farris advised the director that he was ready for the IV team, and they entered to set the IVs. 1/10/22 Tr. 193. The IV procedure took a little longer with Stouffer than with John Grant because Stouffer was heavier and his veins were not as visible. 1/10/22 Tr. 193. Stouffer was calm throughout the execution, in sharp contrast with John Grant's demeanor. 1/10/22 Tr. 193.

29. Stouffer requested a chaplain for his execution, and the chaplain arrived later, around 9:30am. 1/10/22 Tr. 193-194. Mr. Farris, the inmate, and the chaplain waited together in the execution chamber until 10:00am, when the execution began. 1/10/22 Tr. 194. Mr. Farris read the warrant and gave Stouffer a chance to say last words. 1/10/22 Tr. 194.

30. After Stouffer said some last words, DOC started the execution process. 1/10/22 Tr. 194. Mr. Farris observed the first drug being pushed through the IV lines, and then he noticed changes in Stouffer. 1/10/22 Tr. 195. He recalled Stouffer was talking with his chaplain and slurred a word or two, then feel asleep. 1/10/22 Tr. 195.

31. After the first drug was administered, Mr. Farris observed the IV Team Leader perform consciousness checks on Stouffer. 1/10/22 Tr. 195. The IV Team Leader performed a sternum rub, shook Stouffer, called out his name, and may have done something with the pupils. 1/10/22 Tr. 195-196.

32. Mr. Farris was notified through his earpiece that the inmate was unconscious. 1/10/22 Tr. 196. The second and third drugs in the protocol were administered, and then the IV Team Leader came back into the execution chamber. 1/10/22 Tr. 196.

33. On the second time the IV Team Leader entered the chamber, he used a stethoscope to check the heart and lungs, and checked the pupils. 1/10/22 Tr. 196-197. He then exited and Director Crow entered to announce the time of death. 1/10/22 Tr. 197.

34. Donald Grant's execution was scheduled to begin at 10:00am on the morning of January 27. Tr. 1007; *see also* DX 159 (showing date of execution).

35. Once Donald Grant arrived in the execution chamber, the IV team entered to set the IVs. Tr. 1008. The IV procedure was spread out over time with Donald Grant because he was talkative. Tr. 1008.

36. Donald Grant requested a chaplain for his execution, and the chaplain arrived later, around 9:15am or 9:20am. Tr. 1009. Donald Grant explained that the chaplain had not been his for long and was mostly there to watch DOC staff. Tr. 1009.

37. Mr. Farris, the inmate, and the chaplain waited together in the execution chamber until 10:00am, when the execution began. Tr. 1009-1010. Mr. Farris read the warrant and gave Donald Grant a chance to say last words for up to two minutes. Tr. 1010. After about two minutes and 15 seconds of last words, DOC started the execution process. Tr. 1010.

38. About twenty seconds after Mr. Farris observed the first drug being pushed, he noticed changes in Donald Grant. Tr. 1011. He recalled Donald Grant talking about "feeling it" and "still holding on strong" but mumbling his words while getting drowsy quickly. Tr. 1011. Mr. Farris heard snoring within the first minute after he observed the administration of the first drug, and he understood Donald Grant to be asleep at that point. Tr. 1011-1012.

39. After the first drug was administered, Mr. Farris observed the IV Team Leader perform consciousness checks on Donald Grant. Tr. 1012. The IV Team Leader performed a sternum rub, called out Donald Grant's name, and pinched his forearm. Tr. 1012. The sternum rub occurred above the buckle on the straps. Tr. 1012.

40. Mr. Farris was notified through his earpiece that the inmate was unconscious. Tr. 1013. The second and third drugs in the protocol were administered, and then the IV Team Leader came back into the execution chamber. Tr. 1013.

41. On the second time the IV Team Leader entered the chamber, he did a verbal check, used a stethoscope to check the heart and lungs, and checked the pupils. Tr. 1014. The IV Team Leader exited and Director Crow entered to announce the time of death. Tr. 1014.

42. Gilbert Postelle's execution was scheduled to begin at 10:00am on the morning of January 27. Tr. 1014; *see also* DX 160 (showing date of execution).

43. Once Postelle arrived in the execution chamber, the IV team set the IVs. Tr. 1016. The process was a little quicker for Postelle because he was not very talkative. Tr. 1016.

44. Mr. Farris read the warrant, and Postelle declined to say any last words. Tr. 1016-1017. DOC then started the execution process. Tr. 1017.

45. About twenty seconds after Mr. Farris observed the first drug being pushed through the IV lines, he noticed Postelle's eyelids became heavy and started to close. Tr. 1017-1018. Postelle looked asleep one to two minutes after Mr. Farris observed the administration of the first drug, and he was also lightly snoring. Tr. 1017.

46. Mr. Farris recalled seeing a twitch of Postelle's left hand during the execution. Tr. 1018. He also noticed that the blood pressure cuff was inflating on that arm at the same time that he saw the twitch. Tr. 1018-1019.

47. After the first drug was administered, Mr. Farris observed the IV Team Leader perform consciousness checks on Postelle. Tr. 1019. The IV Team Leader performed a sternum rub, calling out "Gilbert," and pinching his right forearm. Tr. 1019. The sternum rub occurred above the buckle on the straps. Tr. 1019.

48. Mr. Farris was notified through his earpiece that the inmate was unconscious. Tr. 1019-1020. The second and third drugs in the protocol were administered, and then the IV Team Leader came back into the execution chamber. Tr. 1020.

49. On the second time the IV Team Leader entered the chamber, he did a verbal check, used a stethoscope to check the heart and lungs, checked the pulse, and checked the pupils with a pen light. Tr. 1020. The IV Team Leader exited and Director Crow entered to announce the time of death. Tr. 1020.

50. The same set of execution straps was used for all four executions in which Mr. Farris participated. Tr. 986. Mr. Farris also identified DOC photographs of the straps. Tr. 986-987; DX 157. There are four straps that cross the torso during an execution: two that come across the shoulder like a harness, and two "bottom straps" that go across the ribcage and

meet in the middle at the sternum. Tr. 987-988. All four straps intersect at a 2-inch circular buckle. Tr. 988-989.

51. During an execution, the bottom straps are set straight across the ribcage. Tr. 987. They do not angle up. Tr. 987. The medical examiner photos of the John Grant execution do not accurately reflect the placement of the straps during his execution. Tr. 987-990; *see* PX 37 at 186. The medical examiner photos are taken approximately 15-20 minutes after Mr. Farris leaves the chamber at the end of an execution. Tr. 988. The bottom straps in photo 186 are angled up, but they were straight across during the execution. Tr. 987. The shoulder straps in photo 186 are also loose, but the shoulder straps were not loose during the execution. Tr. 989-990. Thus, the buckle during the John Grant execution was lower on the inmate than is depicted in photo 186. Tr. 989-990. The medical examiner photos also vary in their strap placement across photos. Tr. 991. Mr. Farris noted that the straps are unbuckled in Photo 199 despite still being buckled in other medical examiner photos. Tr. 991.

B. Director Scott Crow

1. Scott Crow is the Director of the Department of Corrections, with 26 years of experience working for the DOC and an additional nine years in law enforcement. Tr. 1034. Dir. Crow is responsible for Oklahoma's execution process and for ensuring that executions are carried out in accordance with the law. Tr. 1035, 1058. As DOC director, he oversaw the development of Oklahoma's current execution policy and protocol. Tr. 1041-42.

2. The new execution policy improved the old policy by upgrading operational communications during an execution, increasing accountability to ensure use of the correct

drugs, and improving the training component. Tr. 1043. Accountability for verification of the drugs and training were the major changes. Tr. 1043.

3. It is important for a DOC director to have significant discretion to change an execution policy to deal with unforeseen developments. Tr. 1046; Tr. 1058-59. The DOC's execution policy states that these "procedures shall be followed as written unless deviation or adjustment is required, as determined by the agency director or, in the event of an absence, their designee." Tr. 1045 (quoting PX 45, at 1). By the nature of his position as DOC director, Crow has some discretion to change the execution policy and protocol, regardless of whether that discretion is spelled out in the policy. Tr. 1045; Tr. 1060.

4. The DOC's execution policy also states that "[a]ny exception to this procedure will require prior written approval from the agency director." Tr. 1045 (quoting PPX 45, at 32). This provision simply reinforces that *only* the DOC director or his designee can deviate from the policy, and not lower-level employees. Tr. 1045-56.

5. The DOC director's discretion is not unfettered. Tr. 1050, 1058-61. The Director can be fired without cause by the Governor. Tr. 1050; *see also* 57 Okla. Stat. § 506. He can be fired by a two-thirds vote of the Oklahoma Legislature. Tr. 1050; *see also* 57 Okla. Stat. § 506. The Secretary of Public Safety, a cabinet officer, oversees him. Tr. 1051. Any exercise of the director's discretion will be subject to the review of the director's superiors. Tr. 1060.

6. Several of these persons, or their representatives, have attended recent execution training sessions and the executions. Tr. 1052. Director Crow has no doubt that his superiors would intervene in the execution process if necessary. Tr. 1051. The Governor, for

example, could issue a stay of an execution. Tr. 1052. Dir. Crow typically consults with his superiors when making significant changes to operations or policy within the DOC. Tr. 1061.

7. The DOC director's discretion is more limited in regard to Attachment D of the DOC execution policy than it is regarding the overall policy. Tr. 1052. The director does not have the discretion to change the identity of drugs beyond that which is listed in Attachment D. Tr. 1052-54. The director does not have discretion to last-minute insert a drug into Chart C of Attachment D, which is labeled "Reserved." Tr. 1053-54. The director only has the discretion to change the type of drug that is used for an execution if that drug is written in Attachment D and the director provides ten days' notice to the inmate. Tr. 1053.

8. The DOC director does not have the discretion to eliminate a physical consciousness check from the execution process without a formal Protocol change. Tr. 1053-54. He does not have such discretion to use expired drugs for an execution. Tr. 1054. The DOC director's deference to the IV Team Leader is not absolute; Crow would not proceed with an execution if the IV Team Leaders refused to do a consciousness check. Tr. 1055.

9. Director Crow believes that his superiors would intervene and override his decisions if he attempted to change execution drugs at the last minute or if he attempted to remove all medical personnel or consciousness checks from the process. Tr. 1054.

10. As DOC director, Crow was in charge of the executions of John Grant, Bigler Stouffer, Donald Grant, and Gilbert Postelle. Tr. 1035.

11. Relating to those executions, Dir. Crow utilized his discretion to approve of five alterations to DOC's execution policies in writing. Tr. 1047-1050 (citing DX 108-112). Those changes were as follows: (1) photographing the drugs involved 12 hours prior to the execution

instead of 24 hours prior; (2) excusing execution team members from training on a specific holiday; (3) allowing an in-cell metal-scanning device to be used on an inmate instead of an X-ray; (4) allowing an inmate's sister to visit him despite an untimely request; and (5) postponing a specific training time due to inclement weather. *Id.*

12. The DOC used the appropriate combination of midazolam, vecuronium bromide, and potassium chloride, for each of those four executions, in accordance with Oklahoma's execution policy and protocol. Tr. 1035-36, 1041, 1044; 1073-74.

13. Director Crow personally confirmed that the correct drugs were used for those four executions, in accordance with the protocol; he verified them in the room at the time of the executions and beforehand by reviewing the relevant documentation. Tr. 1036-1037.

14. The board with a "rocuronium" label present during executions was a "shadow" board used more for color-coding, to ensure that the syringe is placed is in the proper place, than it was for labeling or drug verification purposes. Tr. 1037-1041, 1068, 1071.

15. Director Crow and the DOC continue to look for ways to improve the execution process, both for efficiency and accountability. Tr. 1041.

16. Director Crow has no doubt about the ability of the DOC to competently handle executions in a fashion that won't repeat mistakes made in the past. Tr. 1072.

C. Spencer Hahn

1. At a preliminary injunction hearing on October 25, 2021, the Court heard the testimony of Spencer Hahn. *See* 10/25/21 Tr. 29-57. Mr. Hahn is an assistant federal public defender that witnessed the executions of several inmates. He has no medical training and has

no medical or scientific basis to believe that in any of the executions he witnessed the inmates were conscious or in pain. 10/25/21 Tr. 47:13-23.

2. Mr. Hahn witnessed the execution of his client Willie B. Smith III in Alabama as one of Mr. Smith's designated witnesses. 10/25/21 Tr. 34:10-18; *see also id.* at 51:5-14.

3. Mr. Hahn claimed that shortly after the execution of Willie Smith began, Smith jerked his left arm, his torso bucked twice, and his breathing became very labored. 10/25/21 Tr. 38:1-12. These movements are consistent with the anesthetizing effects of midazolam on the respiratory system, including airway obstruction. *See supra* I.B., Yen Summary, ¶¶ 23, 41.

4. Mr. Hahn also testified that a corrections officer—not a physician—performed various consciousness checks on Willie Smith, including verbal stimulation, an eyelid brush, and a pinch, all of which Smith did not respond to. 10/25/21 Tr. 39:13-40:9, 49:2-4. This confirms midazolam's efficacy of inducing general anesthesia by preventing response to repeated and painful stimuli. As this Court previously found, it indicates Willie Smith "was not conscious." 10/25/21 Tr. 143:6-14.

5. Mr. Hahn also witnessed the execution of Ronald Smith in Alabama, again as part of the inmate's legal team. 10/25/21 Tr. 41:5-13. When the execution of Ronald Smith began, Mr. Hahn claims he observed Smith jerk his arm inward, buck several times, have labored breathing, and began to cough. 10/25/21 Tr. 44:9-19. Again, these movements are consistent with experts in this case have testified to be the anesthetizing effects of midazolam on the respiratory system, such as airway obstruction. *See supra* I.B., Yen Summary, ¶¶ 23, 41.

6. Mr. Hahn also testified that a corrections officer performed various consciousness checks on Ronald Smith, including verbal stimulation, an eyelid brush, and a

pinch, and Smith did not respond to the first two but his arm moved after the last check. 10/25/21 Tr. 45:1-13. After this response to the consciousness check, Mr. Hahn testified that a second 500 mg dose of midazolam was given to Ronald Smith, and another set of consciousness checks were performed. Mr. Hahn claims to have seen a movement after the pinch, but believes that the corrections officer performing the consciousness check did not observe that movement. 10/25/21 Tr. 45:15-24.

7. Expert testimony regarding movements during anesthesia "casts substantial doubt on the medical significance of Mr. Hahn's observations." 10/25/21 Tr. 144:1-145:17.

D. Julie Gardner and Meghan LeFrancois

1. Ms. Gardner has been an investigator for the Capital Habeas Unit in the Federal Public Defender's office since 2014. 1/10/22 Tr. 22. She attended John Grant's execution and was consistently part of John Grant's legal representation for 15 years prior to his execution. 1/10/22 Tr. 23. Ms. Gardner is personally opposed to the death penalty. 1/10/22 Tr. 23. She has no formal medical training. 1/10/22 Tr. 23-24.

2. Ms. LeFrancois has been an attorney in the Capital Habeas Unit in the Federal Public Defender's office since 2018. 1/10/22 Tr. 36. She also attended John Grant's execution as one of John Grant's lawyers in this case. *Id.* at 37. Ms. LeFrancois is personally opposed to the death penalty. *Id.* She has no formal medical training. *Id.*

3. As this Court previously found regarding Ms. Gardner's and Ms. LeFrancois's testimony, much of it is factually similar to the testimony of Justin Farris and Dr. Yen recounted above. Yet it does not show that John Grant was in severe pain during his execution. *See* Doc. 587 at 5-10.

CONCLUSION

As the testimony summarized above demonstrates, judgment should be granted to Defendants.

Respectfully submitted,

s/ *Mithun Mansinghani*

MITHUN MANSINGHANI, OBA 32453
Solicitor General
OFFICE OF ATTORNEY GENERAL
STATE OF OKLAHOMA
313 N.E. 21st Street
Oklahoma City, OK 73105
Phone: (405) 521-3921
mithun.mansinghani@oag.ok.gov

BRYAN G. CLEVELAND, OBA 33860
ZACH WEST, OBA 30768
Deputy Solicitors General

ANDY N. FERGUSON, OBA 33388
AUDREY WEAVER, OBA 33258
Assistant Solicitors General

Counsel for Defendants